CREATIVELY RE-MEDIATING THE INTEGRATION OF VISUAL RESOURCES WITH SPOKEN EXPOSITIONS DURING SLIDESHOWS IN UNDERGRADUATE PSYCHOLOGY LECTURES

By

MADELINE JENNIFER HALLEWELL

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Abstract

The research describes the communicational practices of HE lectures employing a PowerPoint slideshow in order to examine the multimodal dynamic of this genre for exposition. Based on pragmatist conceptions of learning and theories of visual/ verbal processing, the research explored how different slide-elements were integrated with lecturers' speech, and how this integration related to students' engagement. A two-stage mixed method investigation collected video-recordings of 22 lectures and interviews with 9 lecturers. Additionally, focus groups were carried out with 37 students, and copies of their lecture notes were made and analysed. Using the resulting data, three separate empirical studies revealed;

1) Two characteristic speech-slide relationships were associated with the extent and explicitness of speech-slide integration. In the "referent" relationship, the lecturer addresses and comments on slide-text, and in the "scaffolding" relationship, the slide-text serves to structure their speech.

2) The relationship employed depended on lecturer intentions for the slide-lecture, which predominantly involved elaboration of the lecture outline. Consequently, students regarded slide-text as lecture notes, and expected it to be addressed consistently and explicitly. Owing to their focus on recording the slide-text and accompanying explanation, there was shown to be little opportunity for meaningful interaction with the slide-lecture.

3) Visual elements have the potential to engage students in a meaningful interaction, yet integration of them by lecturers revealed that they were not often exploited to such ends.

It is concluded that the integration of text in slide-lectures presents little opportunity for achieving a fully engaging lecture experience. Although visual elements offer a promising alternative, little is known about how text or visuals can best be integrated with speech to this end. Thus slide-lectures might be more pedagogically profitable if lecturers are better informed about how their integration can be used to invite students to engage with evidence on screen. This thesis contributes towards knowledge about such integration.

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Table of Contents

List of Figures

List of Tables

Chapter 1 Introduction

This chapter introduces the research and outlines the structure of the thesis. It begins with an introduction to the researcher (section 1.1), before defining the lecture (section 1.2) and outlining the context of the research carried out (section 1.2.2). These introductions set the scene for the choice of research topic and the intended contribution to knowledge to be made by the thesis. The chapter closes with an outline of the thesis aims and its structure (section 1.3).

1.1 Introduction to the researcher

I became interested in lectures after going back to university to study for an MA in Educational Research Methods, although my experiences prior to this were influential. On finishing my undergraduate degree in Psychology, I gained some experience teaching 'A' level Psychology at an FE college, where I became interested in teaching and teaching methods. As a new and relatively inexperienced teacher, I found myself replicating the teaching methods which had been used to teach me, and which were common practice within the department. Each session began with a short PowerPoint presentation, in which the relevant theory for the session was introduced before going on to specific tasks in which the theory was applied. I found that the subsequent tasks were often met with bemusement by the students; they had not understood the theory so could not perform the task. Thus I often had to repeat the theory without the slideshow. Despite observing that the students benefitted more from these informal interactions than the slideshow, I continued the practice as I found it easier to plan a slideshow than an informal discussion. Further, the students admitted that the slides were helpful for revisiting later in the session, or during revision once the theory had been clarified. It was clear that the informal discussions *and* the slideshow (or at least, the handout from the slideshow) were helpful, but not

necessarily combined in the format I had been employing. Something about the combination of my verbal presentation with the PowerPoint slideshow, which was invariably mainly text, was inefficient at facilitating student understanding, yet the two resources separately generally appeared conducive to learning.

Following this teaching experience, I became involved in academic research in education. Here I became aware of the vast base of research and theory into teaching practice which helped me come to the realisation that my own teaching practice was not based on any particular school of thought. Rather it was merely an imitation of the practices that I had experienced in my own education. Throughout the MA course, as I became more aware of the different schools of thought and different research fields, I found myself re-evaluating my teaching practices and finding them inadequate in light of all I was learning. Although still interested in teaching as a career, I realised that I wanted to understand the processes of teaching and learning in greater depth. Further, I wanted to understand teaching in the context of Higher Education (HE), as my experiences at university had been most influential on my own teaching practices. I wanted to understand the origins of my habits and consider whether there might be ways in which practices might be enhanced. Lecturing then was my focus of concern, and considering ways in which its practices might be creatively re-mediated was the target.

1.2 What is 'the Lecture?'

The lecture is defined here as continuous exposition by a lecturer to an audience for a pre-arranged length of time (Butler, 1992). It is one of the most common teaching strategies employed by HE providers in the UK (Butler, 1992, Nicholls, 2002, Bell, Cockburn, McKenzie and Vargo, 2001, Ramsden, 2005). Further

to this definition, as this introduction will outline, the lecturer's exposition is nowadays often accompanied by a PowerPoint presentation or other similar pre-prepared visual display, containing text and other visual materials. This thesis holds that the resulting 'slides-plus-speech' format is a distinct form of lecture, and is hereafter referred to as the 'slide-lecture'. Before defining this distinct format, it is worth considering the historical trajectory of the lecture, in order to understand it in its context today.

1.2.1 A brief history of the lecture

As Friesen (Friesen, 2011) describes it, the lecture has its origins in the medieval university as a means of transmitting a text from master to students. The master's work(s) was the lecture text, and the lecturer was its spokesperson. When the printing presses relieved the lecture of its 'textual reproduction' duties it was slowly transformed from repetition of texts to elucidation by lecturers adding 'glosses' or comments to the texts in their lectures, so the authority of the lecture switched to the lecturer. Eventually then, the lecture became the lecturer's authoritative commentary on text(s), or 'one lecturer speaking his mind' (Friesen, 2011, p. 98), and this model of the lecture continued at least until the 1980s. Indeed Goffman's 1980's definition of the lecture echoes this conception of the lecture as:

> '.. an institutionalized extended holding of the floor in which one speaker imparts his views on a subject, these thoughts comprising what can be called his "text"'. (Goffman, 1981, p. 165)

Here the *speech* is the lecture text. However, Goffman's definition was given before the explosion of multimedia capabilities in the lecture theatre and newer ideas

about learning, so that arguably, it does not hold today. A more recent definition is given by Penson (2012), in which he describes the lecture as:

> '...a learning event in which one member of faculty interacts with a number of students. The session predominantly involves the lecturer talking about the topic in hand, but it can also include activities, such as short discussions between students, question-and-answer sessions, group work, and other "enhancements" usually associated with smaller class sizes.'
> (Penson, 2012, p. 73)

The main difference between the definitions of a lecture in the 1980's and today seems to be the possibility of the inclusion of activity and interaction between the lecturer and student. However, what is missing from Penson's definition is the inclusion of a PowerPoint (or similar) slideshow, which has become a ubiquitous presence in today's lecture theatre.

PowerPoint, launched in the 1990's originally for commercial and business purposes, has since made its way into the lecturer's tool box. Through the adoption of PowerPoint for teaching, lectures are now expected to be accompanied by a slideshow often to be made available as a handout to students in advance of the lecture in order to provide an outline of the lecture material. This outline is mainly in text format, and often with the addition of a variety of multimedia. Thus although HE lectures were traditionally characterized by verbal presentations, they are now, more than ever, multimedia events. Before considering the impacts of the rise of PowerPoint, it is worth considering further the context of today's lectures, as it seems that lecturing has entered a new paradigm since the 1980's.

1.2.2 Context of the New Lecturing Paradigm

University practices are highly influenced by political and economic pressures. Changes in Government often precede changes in funding structures for universities, inevitably impacting on their spending priorities according to the demands of society at the time. This context is described as a feature of the new 'politics of knowledge', in which the university has had to embrace market values to form a 'triple alliance of university, industry and state' in order to survive (Delanty, 2001, p.143). Indeed, the Governmental change from Labour to Conservative leadership in 1979 brought about a focus on the more 'economic' distribution of funding within universities, along with an increased demand for performance measurement and accountability (Henkel, 2000). Trends during the 1990's saw universities acknowledging pressures towards market values as a result of capped budgets and 'transparent resource allocation' (Henkel, 2000). Universities were gradually becoming consumer oriented businesses which had to answer to the state and to the businesses employing their graduates.

These changes each carry their own policy pressures concerning the way in which universities teach, along with pressures from further stakeholders; funding bodies, research councils and so on (Maier, 1998). Importantly, these pressures usually carry with them a call for 'excellence'. To become excellent, universities must invest in more efficient/ effective methods of teaching, often through the investment in new technologies for learning and knowledge production (Maier, 1998) or teaching and learning space design. Moreover, they must do so within ever more demanding contexts, as the student body not only grows, but evolves, as the next section details.

1.2.2.1 Changing Student Population

The present research was begun in October 2009 within the context of an 'unprecedented' rise in student admissions (UCAS, 2009), coupled with the uncertain

future of the tuition fee increases. These two factors reinforced the importance of focussing on the 'student experience' and on value for money within HE, as students were not only to be paying more for their university education, they were also sharing their experience with a larger student population. Figures from the Higher Education Statistics Agency (HESA) show that the population of students saw an increase of 31.2% over 4 years from 2004-2009, (HESA, 2009b). Yet over the same time period, numbers of teaching staff increased by only 11.34% (HESA, 2009a). Examining the student-to-staff ratio (SSR) then reveals that the number of students per member of lecturing staff increased in this time by 45.7%[1]. Universities generally did not match the increase in demand (students) with an appropriate increase in resources (teaching staff) leaving the SSR decidedly overbalanced. Similar statistics for more recent years are not currently available, yet the HESA (2012) suggests that while the total student population increased by 0.3% between 2010 and 2011, the total staff population *decreased* by 1.5%. Thus it can be assumed that the SSR is now even more overbalanced. Of course, such effects would be felt differently depending on the status and resources of the university. Yet the general context of this research was one of larger student populations paying what was considered at the time to be a premium for their education.

Given the SSR context, it may be that owing to the lecture's relative low cost compared to a more personal approach to teaching (i.e., tutorials/seminars etc.), its presence may be maintained as the most viable solution to cater efficiently for a larger student population. Lecturing to many students is undoubtedly a more economical way of increasing contact hours than providing more personalised contact (MacDonald- Ross, 2011). Although it remains to be seen whether students will

[1] In 2004/05 the ratio was around 164:1, whereas in 2008/09 it was 239:1

accept this definition of contact hours, the outlook is based on the assumption that students as consumers will compare universities on the amount of contact time provided, and take their business to the university providing the most value (i.e. contact hours) for money (MacDonald- Ross, 2011). With media claims that the cost to the student of the average lecture is 'estimated' at between £15 and £50 per hour (Henry and Williams, 2011) and in some cases up to £135 each (Taylor, 2011), their effectiveness in providing an engaging experience for students is now more crucial than ever.

1.2.2.2 Technological change

One area in particular which addresses the issues of a changing HE landscape is that of the design, development and adaption of educational technologies. Not only have these developments gone some way to alleviate SSR issues, even in large classrooms, it is clear that advances in lecture theatre technologies are in support of an interactive learning experience. Some interactive technologies are slowly establishing themselves as particularly widespread within the lecture experience, such as Electronic Voting Systems (EVS)[2]. The use of EVSs has been regarded as having positive impacts on learning outcomes (Kennedy and Cutts, 2005), and these benefits are believed to apply across all university disciplines (Draper and Brown, 2004). For instance an EVS facilitates the ability of the lecturer to see common mistakes and areas of weakness in their class, which can then be rectified immediately, rather than after marking a first set of assessments (Draper, Cargill and Cutts, 2002). It is suggested that the participation in such polling requires active processing of the lecture material, leading to better learning outcomes (Kennedy and Cutts, 2005); that

[2] Typically involving the use of individual 'clickers' for use when questions are posed by the lecturer allowing each student to respond electronically and their responses fed back immediately to the lecturer.

is students are forced to synthesize the material in order to come to a decision about their answer.

It is not only technologies specifically designed for interaction which might bring opportunities for interaction. It is now becoming more common for lecturers to video-record their lectures for dissemination on a Virtual Learning Environment (VLE) (Buxton, Jackson, deZwart, Webster and Lindsay, 2006, Zupancic and Horz, 2002), which allows the student to experience the lecture again, and at a time and place to suit them. This technology is thought to result in the enhancement of many aspects of the live lecture, including interaction, because the lecturer strives to enhance live lectures with participation to encourage students to attend, rather than view the recording at a later date (Morris, Hardy and Hinrichsen, 2009).

Yet even without the help of technologies, lecturers have fostered interaction in their lectures, for example, through small group work (Jenkins, 1992). However, it must be noted that the physical environment in which the lecture takes place has a large impact on the teaching strategy used and the learning activity that will occur (Oblinger, 2006). Lecturers often have to make do with whatever technologies are available in their lecture theatre. Most universities today tend to provide predominantly large lecture theatres oriented around a single display screen, rather than small intimate classrooms equipped with interactive technologies. These large spaces are thought to be more permissive of a teacher-led teaching strategy than active participation by the student (Jamieson, Dane and Lippman, 2005).

Perhaps technological change has done more for students' private study than for group learning situations. The availability of recorded lectures has allowed students the opportunity to revise and review the lecture time and time again (Gosper,

McNeill, Woo, Phillips, Preston and Green, 2007, Williams and Fardon, 2007). VLEs provide additional resources, and a variety of communicative devices for interaction outside of formal teaching hours. Web technologies have opened up many avenues for sharing knowledge and for asking questions via Blogs, forums, Wikis, chat, social networking and so on. These may bring some benefits to the students who have longer to absorb the information and can go over something they may not be sure about. Further they have access to a wider variety of 'authorities' on certain subjects, and they can even create their own material to contribute to knowledge. Yet, these are often instigated by individual students, or by the technology-savvy lecturer, and are by no means employed across the board (Yick, Patrick and Costin, 2005). Further, there is little evidence of how this kind of engagement can be fostered within the lecture itself.

Worth keeping in mind is that the speed of development means that technologies used by both students and lecturers for educational purposes can quickly become obsolete (Brown and Long, 2006). Similarly relevant are Cuban's (1986) observations concerning the patterns of the institutions' original enthusiasm for technology being met with low take up by teachers, followed by teacher bashing when these technologies are left to sit unused in cupboards. Universities will inevitably be concerned about being seen to waste money on the latest fad, only to have it collecting dust after a few months because lecturers have not been able to use it. However, it will come as no surprise to those who have attended a lecture in the past decade that, of all lecture theatre technologies available, the most persistently utilised is the PowerPoint presentation.

1.2.2.3 PowerPoint's adoption in HE

The PowerPoint presentation is 'everywhere' in HE (Tufte, 2003). PowerPoint was originally based on a piece of software written in the 1980's to fulfil the need of one presenter to create a script for a presentation that allowed several 'frames' to be printed on a piece of paper with room for text. This frame became his storyboard for the presentation, which then became the inspiration for the software, developed to improve sales pitches. The idea was adopted by the company that eventually turned the idea into 'PowerPoint' (Parker, 2001). Owing to its affordances for displaying text outlines and summaries along with a variety of multimedia, PowerPoint has been universally adopted outside of the business environment, and particularly within HE.

The impacts of this adoption are much discussed within pedagogical literature. It can be argued that PowerPoint slides have become the focal point, and thus, the authority of the lecture. PowerPoint slides can not only be amplified onto a large display screen at the front of the lecture hall, but they can also be accompanied by printed handouts or access to the same slides via a VLE for students to download before or after the lecture (Chen and Lin, 2008). Unsurprisingly then, there has been a wave of enthusiasm for the use of this 'slide-ware', followed by a widespread denouncement of the effectiveness of the practice in facilitating learning. This denouncement is led by authors who point out that the problem is not the technology itself, but rather the way in which it makes us think in short, linear bulletpoints (Tufte, 2004) which are a 'trap for bad teaching' (Klemm, 2007).

Owing to the low resolution of PowerPoint and the screens that are used to display PowerPoint slides, Tufte, (2004, 2006) argues that as PowerPoint invites a particular form of stunted presentation (i.e. the 'bulletpoint'), it also necessitates a particular form of stunted cognition. He argues that the small space provided for text

motivates an abbreviated style of writing because ‘many true statements are too long to fit on a [PowerPoint] slide’ (Tufte, 2006, p. 5). Bulletpoints then, according to Tufte, result in the use of ‘sloganeering’ or the use of stunted sentences. These stunted sentences serve to ‘dilute thought’ and their list-like structure serves to reduce the complexity of relationships to simple hierarchies. Most damning, however, is Tufte’s account of PowerPoint’s role in the 2003 Columbia spaceflight disaster. He argues that owing to the hierarchic nature of one of the key slides given in a presentation to NASA assessing the potential risk caused by damage to the shuttle, the severity of the threat posed by the damage was lost in translation of the slide. The key information was presented as a lower level sub-point, thus minimizing its perceived saliency (Tufte, 2004). Thus a potentially avoidable disaster occurred as a result of de-emphasizing a major threat on a PowerPoint slide, leading Tufte to conclude that PowerPoint was responsible for misleading NASA scientists into believing that the risk was minimal.

Despite such criticism, PowerPoint has endured the backlash and has become the most frequently used technologies in lecture theatres today[3]. Now students have come to *expect* that lectures will be accompanied by a PowerPoint presentation. Further it seems that PowerPoint may have come out of the backlash stronger, with many academics now seeking not to point out what PowerPoint can’t do, but highlight its pedagogical strengths (e.g. Nicholson, 2002, Bartsch and Coburn, 2003, Gallagher and Reder, 2004). It may be more pragmatic then to focus on increasing the impact, or at least avoiding the pitfalls of widely used PowerPoint, than to pour resources into new developments. If lecturers already use technologies, they might be encouraged to

[3] Especially within undergraduate Psychology teaching, which is the teaching and learning context that forms the focus of this thesis.

consider how making small changes to their use will impact on their teaching and their students' learning.

Owing to its ubiquity then, PowerPoint forms the focus of the research. Of course there are a whole host of similar software, such as Keynote, SlideRocket, 280 Slides, and some even claiming to solve the issue of linearity in presentations, such as Prezi. It is yet to be seen whether these new tools really can change lecture presentations, or whether the 'cognitive style of PowerPoint' (Tufte, 2004) will live on in another format. Indeed in a Prezi presentation, although the presentation is structured in a nonlinear format by the creator, the audience nevertheless gets to focus on individual screens one after the other in a linear manner. Thus the use of the word PowerPoint in this thesis should be taken as an umbrella term for slide-ware packages which allow the presentation of text and multimedia on separate screens or 'slides', one at a time on a large display screen.

In writing this thesis I intend to build on the base of literature rejecting the typical slide-lecture practice, and therefore the use of PowerPoint in lectures. The next section outlines the aims of the research, before the intended contribution to the knowledge base regarding slide-lectures is identified in the following chapter.

1.3 Aims of the research and outline of the thesis

The thesis aims to consider whether the slide-lecture needs to be configured for better teaching and learning experiences. In order to do so, it seems important to provide a description of the slide-lecture practices so that those which are problematic or profitable might be identified. Also needed is an examination of its impacts on both the planning and receiving of lectures, and finally consideration of whether there are

more creative ways of mediating slide-lectures to improve learning experiences. Thus the research examines three broad areas relating to the slide-lecture;

1. The nature of the slide-lecture
2. The teaching and learning experiences created by the slide-lecture
3. Creative approaches to the mediation of the slide-lecture for both teaching and learning.

Having been a part of the discipline of psychology as a student, as a researcher and in a teaching capacity, I have witnessed what it is to teach and to receive teaching on the subject, in addition to what it is to be a researcher in the discipline. This level of experience would enable a more educated observation on the lecturing practices within a specific discipline. Thus psychology is selected as the subject area of focus for this project, owing to my own background, interest and experience in the subject. Further, the social sciences are considered to be particularly lecture-heavy disciplines which rely on the format for much of their teaching (Neumann, 2001), thus much of the instruction that psychology students receive on their course is delivered in lecture format. Undergraduate courses are also selected as an area of focus, as these include more taught aspects than postgraduate courses and, as such, the lecture is more prevalent in an undergraduate experience. Further, since undergraduate courses are generally more populated than postgraduate taught courses, research on undergraduate teaching would have a greater range of applicability. Thus the research aims are directed towards slide-lectures given in undergraduate psychology.

The thesis is set out in 8 chapters. Chapter 2 provides a review of the literature relevant to the slide-lecture, and identifies the slide-lecture as a distinct genre of pedagogical communication. Through identification of the underlying assumptions about learning, the chapter outlines the questions arising from identified gaps in

existing knowledge which will be addressed by the empirical work, and therefore identifies the intended contribution to knowledge for the thesis. Chapter 3 draws on these assumptions and identified gaps in order to justify the selected methodology for the research, and gives an account of the methodological approach taken.

The communicational practices employed in psychology slide-lectures in relation to written text is characterised in Chapter 4, which is the first empirical chapter. The second empirical chapter (Chapter 5) examines the reasoning behind psychology lecturers' integration of slide-text, and whether this fits with the students' conceptions of the role of slide-text in the lecture. Chapter 6 then considers the impacts on psychology lectures that the integration of visual representations introduces, and in particular the barriers that students may face but also the opportunities for learning that might arise from negotiating the relationship. It considers what the lecturer's relationship with visual representations might do for the student and whether particular practices might be more beneficial than others.

Following this, Chapter 7 provides a general discussion which connects the three major areas of investigation, and considers whether the gaps in knowledge can be adequately filled by the current research. Finally Chapter 8 outlines the conclusions which may be drawn from this research, recommendations for psychology lecture practice that can be suggested, and the extent to which the intended contribution to knowledge has been fulfilled.

Chapter 2 The slide-lecture as a distinct form of pedagogical communication

2.1 Introduction

Chapter 1 identified the need for creatively re-mediating lectures as a teaching strategy in the context of rising pressures from changes in policy, the economy and student body. It also introduced the idea that PowerPoint might have an impact on the practices employed in lectures. To restate the research aims, the purpose of the thesis is to describe the nature of slide-lectures in undergraduate psychology, and to examine the intentions behind them and the experiences of them in order to consider options for their creative re-mediation.

This chapter considers the existing knowledge regarding slide-lectures in general university teaching in order to identify the questions that are left unanswered and to define the gaps in knowledge potentially to be filled by this research. Thus the chapter will consider existing conceptualizations of slide-lecture practice (section 2.2.2) before identifying its strengths and limitations in HE teaching (section 2.3.2). The chapter will then consider the communicational context of slide-lectures (section 2.4), before outlining research questions based on gaps in knowledge about this matter (section 2.7).

The chapter will present the argument that the slide-lecture as a form of communication is distinct from the ‘traditional’ lecture as discussed in much of the existing literature and, as such, it needs examining anew for its influences on pedagogy. When considering slide-lectures and their place in undergraduate psychology pedagogy then, it is worth firstly considering the wider context of lectures

themselves, as there is an on-going debate in the educational literature about the effectiveness of lectures. Thus the chapter begins with an account of the lecture as a teaching strategy (section 2.2).

2.2 The Lecture: Is it broken and does it need fixing?

We are said by some commentators to be living within a knowledge economy, where knowledge and its creation is intrinsic to everything we do, especially in our working lives (Hargreaves, 2003, Brennan, 2008, Lyotard, 1999). Moreover, in a global context, the need for a workforce skilled in knowledge creation becomes even more important in order for people to prosper in an international economy (Beck, 2002). In this knowledge economy, graduates are likely to go into a career in which they are required to use their skills to create and use knowledge (Guile, 2001). This worldwide change has resulted in a shift away from the need for experts to tell us what we should know, to the need for help with methods of finding it out for ourselves (Hargreaves, 2003, Brown and Long, 2006). Beck (2002) describes this shift in worldview as a movement away from 'lecturing societies', to those in which people have to take responsibility for learning how to experiment and take an interest, and also should be able to *disagree* with accepted knowledge to create new knowledge. This shift might have motivated the increased focus on interaction in HE teaching. Indeed Laurillard (2002) suggests that teaching strategies must now focus on teaching not 'what is known' but 'how to come to know'.

However, as a pedagogical strategy, lectures are often criticised for the 'transmission' of information (Laurillard, 2002) which promotes the relatively passive transfer of knowledge from 'expert' to 'novice' (Ramsden, 2003). Many would therefore challenge the lecture format and encourage a move away from traditional

lectures to more interactive teaching activity, in the belief that this would enhance the right kind of educational outcomes (Knight and Wood, 2005, Phillips, 2005). However, the obstruction of such pedagogy might come as a result of the various political and economic contexts within which HE teaching is placed, as outlined in Chapter 1. Thus it is important to consider the place of the lecture in HE teaching and learning, and its potential barriers and opportunities for both for today's knowledge society.

In order to consider the lecture as a pedagogical strategy, it is first necessary to consider what the desired outcomes are. In considering the pedagogical issues related to the lecture and slide-lectures in particular, it is worth questioning what *kind of* learning one would hope to achieve with it. The underlying conception of learning that this thesis adopts is based upon pragmatism, as outlined below.

2.2.1 Theory of learning: Pragmatism, the Cognitive Theory of Multimedia Learning and learning as an experience

Pragmatism as a theoretical tradition rests largely on the work of John Dewey whose fundamental belief about the nature of philosophy and philosophical inquiry is that it should begin with a practical starting point arising out of actual lived experiences (Hildebrand, 2008). Hildebrand describes the impact of this belief as having a specific impact on inquiry, which he states should not be guided by a predetermined general overarching theory or philosophical assumption, as according to Dewey, such a practice leads to 'insoluble' problems. Rather inquiry should be a bottom-up approach, in which investigators seek solutions to current practical issues, guided by actual experiences. In other words, inquiry involves real people dealing with real problems within a particular period of time. In this way, Hildebrand states that Dewey's pragmatism provides a flexible framework for inquiry, as within this

framework it is accepted that solutions which emerge in the present may become problematic in the future. Thus research guided by a pragmatic framework should embrace the dynamic nature of problems, and seek to provide sustainable solutions, i.e. solutions which are open to adaptation depending on the needs and contexts of the time. As Chapter 1 describes, the landscape of HE and lectures in particular is constantly evolving, meaning that such a framework for flexibility relates well to educational inquiry. For this reason, Elkjaer (Elkjaer, 2009) describes pragmatism as being a learning theory for the future.

According to Elkjaer, pragmatism (as a learning theory) is based on Dewey's conception of experience (Dewey, 1896). For Dewey, experience can be defined as a 'transactional concept', meaning, for my purposes, that experience is a result of mutual relations between the student and the environment, which merges, rather than separates, action (or learning) and thinking (Elkjaer, 2009). Dewey's concept of experience is future oriented rather than about the past only; meaning that we experience learning with the past *and* future in mind (that is, we consider what we might need to use the experience for in the future, based on past experiences) (Elkjaer, 2009). Therefore, cognition is necessary to enable continuity of the learning experience, or the ability to link past, present and future aspects of the experience, but in Dewey's conception of experience there is more to experience (or learning) than cognition, or 'conscious thinking'. As Kivinen and Ristela (2003) suggest, learning is conceived of as 'acquiring accurate representations of "reality"' (2003, p. 369) which occurs through social action and discourse. Thus for my purposes, applied to the lecture situation, learning is conceived of here as a cognitive event in which the student is engaged in a process of interacting with the lecture material in such a way that prior knowledge is utilised in order to make sense of the new information. This

engagement is more than simply accepting and memorising the lecture material, rather it involves a meaningful exchange between the student and the material, connecting past and present. In this sense, each student's experience of the lecture will be unique. Relating this framework of learning to the inquiry in hand then, the research should examine ways in which this experience can be facilitated in lectures, and seek flexible (or creative) solutions for its facilitation.

In order to consider the facilitation of this learning experience, the cognitive affordances for it to happen is focussed on here. Thus the extent to which cognitive space is available to students to process the learning experience during lectures employing PowerPoint is in question. With students listening to the lecturer speaking whilst watching and potentially reading text on a slideshow, is there space in slide-lectures for students to engage with and reflect on the material as well?

In order to consider this 'space' for experience, the Cognitive Theory of Multimedia Learning (CTML) (Mayer, 2005b) is used as a guiding framework to examine the opportunities for and barriers to a cognitive engagement with slide-lectures. The CTML provides the ideal framework for considering slide-lectures as it accepts the idea that multimedia learning situations are characterised by visual and verbal information (that is, visual and verbal 'streams') which are combined into a single message by the student. Importantly, a distinction is made between visual and auditory modes of presentation (stream) and visual and verbal processing (channel) within the student. Here, although written text might be displayed visually (such as a bulletpoint in a PowerPoint slide), the information is verbal in nature, and so is processed by the visual *and* verbal channel (Mayer, 2005a). The CTML is based on four central assumptions, outlined by Mayer (2005a) as follows;

1. The ‘dual-channel assumption’ which holds that verbal information (including both written text and auditory narration) is processed by the verbal channel, and visual information (that which is displayed visually) is processed by the visual channel.
2. The ‘limited capacity assumption’ which holds that there is a limit to the amount which can be processed by each channel at any one time.
3. The ‘active processing assumption’ which holds that humans are active processors who are constantly attempting to assimilate, organize and generally attempt to make sense of multimedia information.
4. The ‘multimedia principle’ which holds that ‘people learn more deeply from words and pictures than from words alone’ (Mayer, 2005a, p. 31).

The assumptions of the CTML are highly relevant when considering a learning environment which contains both visual and auditory streams containing both visual and verbal information, often presented simultaneously. According to the CTML, instructors should design their instructional material to avoid overloading either processing channel, which can occur when large amounts of complex information are presented either visually or auditorily exclusively. Instead, they should strive to integrate the visual and verbal materials where possible (Mayer, Moreno, Boire and Vagge, 1999). For the argument presented in this thesis, it is assumed that students are not passive recipients of slide-lectures; rather they are constantly attempting to integrate information about messages presented in both modalities. Further, it is assumed that the way in which the lecturer manages this dual presentation of information may either facilitate or hinder the students’ cognitive processes aimed at understanding both streams together.

In terms of the theoretical framework for the research then, it is accepted that the issues relating to slide-lectures are dynamic and inquiry into the issues needs to be based on practical rather than theoretical insights. When applying this pragmatist framework to learning in slide-lectures, one practical issue that emerges is the extent to which the learning experience can be facilitated when demand is being place on the students' cognition from a number of directions. Although not used as a theoretical starting point then (which would contradict the foundations of pragmatism), the CTML is used as a means to examine and identify problems within the slide-lecture. Bearing in mind the contextual setting of rising SSRs and the persistence of the teacher-led lecture, coupled with the dominance of PowerPoint, it seems relevant to question whether slide-lectures do or indeed can allow this interactive experience. Further, can mass teaching situations ever foster an environment in which students are able to question the discourse in order to create and develop knowledge? To consider this further, the literature relating to the functionalities of the lecture must be consulted.

2.2.2 Functions of the Lecture

The issue of how effective the lecture is in terms of learning outcomes is largely undecided. One of the leading authorities on lectures, Donald Bligh suggests in his seminal book 'What's the use of lectures?' (Bligh, 2000, Bligh, 1972) some affordances of this teaching strategy which might explain its predominance in the HE teaching repertoire. He notes that, although a 'transmission model' of education is generally rejected, in some learning/ teaching situations, transmission of knowledge is the aim and lectures fulfil the function equally effectively as other teaching strategies such as discussion. Yet Bligh's work also lists the objectives which should *not* be addressed by lectures, which provides a compelling argument against their use. For

Bligh, the lecture fails at such functions as promoting thought, teaching values in relation to the subject, changing attitudes, inspiring interest in the subject, and modelling 'personal and social adjustment' and behavioural skills (Bligh, 2000). Thus according to Bligh, the lecture is useful when a lecturer wants to impart information, yet it will not achieve more ambitious pedagogical aims.

Although Bligh's original observations on the use of lectures were published in the early 1970's, and have changed little in later versions of the book (e.g. Bligh, 2000), a recent review of his work in relation to today's lecturing concludes that lectures are no more useful than they were in the 70's (MacDonald- Ross, 2011). Additionally, there are many more recent commentators echoing Bligh's view that the lecture is ineffective in anything other than transmission. For instance that the lecture is ineffective in customizing the learning situation to the individual's needs, providing immediate feedback, being constructive, motivating students and building enduring conceptions for long term retention (Foreman, 2003). The consensus seems to be that the lecture performs one function well, that of transmitting information, but does little else for HE pedagogy.

However, it must be noted that Bligh also suggested that the lecture *has the potential* to provoke thought and change attitudes of students depending on how it is used (Bligh, 2000). Further, it has also been noted that it can be used to inspire students by the lecturer linking the information to real life situations, (Ramsden, 2005, Dolnicar, 2005). McKeachie and Svincki (2006) advise that:

> 'By helping students become aware of a problem, of conflicting points of view, or of challenges to ideas they have

> previously taken for granted, the lecturer can stimulate interest in further learning in an area' (McKeachie and Svinicki, 2006, p. 58).

It is possible that with mindful usage, the lecture should not be confined to descriptions of transmission pedagogy. Indeed, in surveying actual lecturing practice it has been found that lecturers use lectures for a range of different purposes. For example to make students think critically about the subject, to demonstrate the way professionals reason or to make students more enthusiastic about the subject (Isaacs, 1994). Additionally, literature relating to specific disciplines advises that lectures are effective in achieving a number of different aims, such as helping students to see their course as a whole, (Penson, 2012) or modelling mathematical reasoning and motivating deeper learning practices in students in mathematics education (Pritchard, 2010). More recently, Sutherland and Badger's (2004) survey of lecturers revealed that in business and biology, provision of information was the most cited function of the lecture, yet in subjects such as accounting, mathematics and nursing, demonstration was the most cited. In economics it was introducing students to the particular ways of thinking of the discipline, in English it was motivation. Finally, in history and education, lectures were used to teach students to think critically.

However, it is not clear from these analyses how the lecture achieves such goals in practice. As Penson, Pritchard and Sutherland and Badger's suggestions were made fairly recently, perhaps the introduction of new lecture theatre technologies has influenced their beliefs about the functions that can be afforded by lectures. Indeed, the technological changes to lecturing pedagogy outlined in section 1.2.2.2 were all presumably introduced in the belief that they would improve the functionality of lectures through enabling interaction. Owing to new technologies then, lectures in

today's context might perform many different and presumably pedagogically beneficial functions, none of which, according to Bligh et al., can be achieved by traditional conceptions of lecturing.

It seems that there is a divergence of opinion between lecturers and commentators on lecturing in terms of what the lecture can achieve. The jury is still out on whether or not the lecturer is broken, though the possibilities for fixing it have grown since Bligh's comments during the 1980's, perhaps as a result of the availability of more interactive technologies. Further, it is recognised that despite its contentious position in pedagogical literature, the lecture is still a commonly adopted practice throughout HE and in psychology in particular. It is acknowledged that the success of lectures as a teaching strategy might depend on a number of variables, including disciplinary traditions and potentially individual lecturer intentions. Further, that many different technological 'fixes' have been introduced suggests that is it accepted that the lecture might have varying levels of success as a teaching strategy, depending on what kind of 'fix' has been employed. Bearing in mind that lecturers are commonly provided with large lecture theatres equipped for PowerPoint presentations, PowerPoint might be the most common strategy employed to enhance the success of lectures. The next section examines why this is so.

2.3 Conceptualising the PowerPoint slide-lecture

For as long as it has been possible to show visual representations of objects referred to in lectures, lecturers have taken the opportunity to do so. Art historians have displayed slides of famous paintings (Nelson, 2000); geographers have shown rock formations and landscapes (Rose, 2003); photographs of diseased and non-diseased cells have been displayed to medical students; and engineers have displayed

diagrams of equipment and their components. Psychologists too have made use of visual displays, for example in showing representations of the brain functioning under different stimulus conditions. Here the lecturer can invite students to engage with and question the visual material. In the past (prior to PowerPoint) this 'showing' might have been achieved through the use of an overhead projector (OHP) (Murray, 1979). However, it is observed that OHP's were not necessarily exclusively used for showing diagrams and pictures; rather the transmission of information became more common:

> 'While some teachers were able to use overhead projectors to engage student activity and response, most used overhead projectors to convey information.' (Olliges, Mahfood, Seminary and Tamashiro, 2005, p. 65)

Moreover, as Lowry (1999) recalls, until the mid-1990's his lectures consisted of OHP transparencies created using a word processor which included 'essential points' of the lecture along with diagrams and summaries. It seems that many OHP presentations were used as a kind of lecture text outline rather than as a slideshow of images.

We might suppose that PowerPoint's affordances for the inclusion of audio-visual materials; video, animations and so on would eclipse such a practice. The ability to display textual, visual and dynamic modes simultaneously along with the spoken exposition has undoubtedly been advanced by slide-ware technologies. It is easy to embed a video or image on any PowerPoint slide and to switch seamlessly from one to the other with the click of a button. PowerPoint then has become a common addition to lectures, especially within the discipline of psychology. Indeed within a discipline which relies heavily on observations of people and behaviours, it is

a great benefit to be able to show these behaviours and their related processes to students in a lecture situation.

However, as the default style of PowerPoint presentations is the bulletpoint list (Tufte, 2004), again it seems that the tendency for displaying text has been continued. Thus there has been much discussion, multimedia capabilities aside, about whether or not PowerPoint has provided pedagogical benefits over and above traditional visual displays such as OHP's, or no visual display at all. Although PowerPoint might in some ways have maintained the *status quo* of OHP lectures, it is assumed here that the PowerPoint lecture (or slide-lecture) is a distinct pedagogical communication practice. Before considering the benefits and, alternatively, the pitfalls of slide-lectures, it is necessary to outline a characterization of the typical use made of slide-lectures that make it a distinct form of lecture based communication.

2.3.1 The slide-lecture as a distinct form of pedagogical practice

In this thesis it is assumed that the slide-lecture as a form of pedagogical practice is distinct from traditional conceptions of the lecture. Firstly then, it is essential to define the differences between slide-lectures and 'traditional lectures'. Researchers who compare the 'traditional' lecture to other methods of lecturing often either describe it as an OHP based presentation in which transparencies are displayed via a system of lamps and mirrors onto a display screen whilst the lecturer speaks (e.g. Ahmed, 1998, Nouri and Shahid, 2005), or a chalk-and-talk presentation in which the lecturer writes on a chalkboard whilst talking (e.g. Savoy, Proctor and Salvendy, 2009, Amare, 2006). Here then, 'traditional' lectures are conceived of as those employing OHP or chalk-and-talk methods of presentation. The slide-lecture is defined as a lecture in which an electronic screen displays a sequence of discrete visual screens (containing either text or multimedia or a combination of both)

successively in a PowerPoint (or similar) slideshow whilst the lecturer speaks about the screens to the students. Predominantly, these screens, or 'slides' will be available electronically to students either in advance of the lecture, or at some point afterwards, so that they can view, print and revisit at will.

The first point of departure from the 'traditional lecture' then is that this handout practice is potentially more prevalent owing to the ease with which it can be achieved. Although such handout practice might be carried out through photocopying OHP transparencies, or through lecturers duplicating their chalkboard writings electronically, existing slide documents can more be easily uploaded to a VLE or emailed to students. Thus the pedagogical culture that slide-lectures constructs is one in which the students can easily access a copy of the slides without necessarily attending the lecture.

Other features which distinguish the slide-lecture involve its presentational affordances. In a pre-PowerPoint era article extolling the use of OHPs over chalkboards, Murray (1979) gives advice on techniques which improve an OHP presentation's impact. He suggests the use of plain paper to cover up sections so that lecturers may go through the argument one point at a time, and even recommends using a pen to point out specific parts of the visual display. Further, Murray goes on to consider the ways in which lecturers might show movement by utilising special equipment and overlays on their diagrams (Murray, 1979). With a PowerPoint slideshow however, such physical measures are not required by lecturers, they need only to press a button to show animations or to highlight different things on the screen. Additionally, audio-visual material can be embedded into the PowerPoint slideshow, whereas this kind of resource previously necessitated separate TV

equipment. Thus the slide-lecture enables a more efficient execution of the presentation.

The further technical advantages of PowerPoint over its predecessors have been summarised by Gunderman & McCammack (2010):

- It makes the display of photographs and other visual material easier than, say, using a slide projector;
- The images themselves can be better quality, through digital enhancements
- Slides can be updated quickly and efficiently,
- PowerPoint files are portable (e.g. via USB or email), without the risk of them being lost or damaged,
- PowerPoint files can incorporate a wide range of multimedia, and,
- It is user friendly

Compared to OHP then, the slide-lecture might save time in both the planning and execution of the lecture, potentially allowing lecturers to cover more material. For instance instead of drawing out their animations by hand and using complicated paper based manoeuvres to enact it, the lecturer can show an embedded video clip. Further, changes to presentation materials once would have involved a reprint or rewrite of the OHP transparencies, lecturers can now simply change the slide in the PowerPoint document. Thus lecturers have a more efficient means of making significant changes to the lecture (Kunkel, 2004) making PowerPoint a more efficient tool than OHP's (Mantei, 2002). Thus another distinction is the affordability for efficiently building a variety of different resources into the presentation.

There are clearly inherent differences between chalkboard, OHP and slide-lectures which warrant the consideration of lecturing with PowerPoint as a distinct

practice. Although similar to its predecessor the OHP, PowerPoint enhances certain aspects which set the modern slide-lecture apart, such as the affordances for embedding multimedia and their portability. Importantly though, it introduces another actor to the teacher-student relationship, which although present in traditional lectures, was characteristically different. This is the slide and its resulting handout. The introduction of different actors to the lecture dynamic is important when considering the conception of learning identified in this thesis, in which learning involves an interaction between lecturer, student and resource. Thus it is important to consider the justification of using PowerPoint in lectures over traditional lectures. In terms of support on educational grounds for the use of slide-lectures, there is little justification of their popularity, as the following evaluation identifies.

2.3.2 Evaluating slide-lectures

Effective instructional design involves considering the students' needs and designing learning and teaching materials to meet these needs. Lecturers should only use an instructional technology when there is instructional justification for doing so (Ziegenfuss, 2005). The following sections consider the extent to which slide-lectures have such instructional justification through firstly considering educational concerns related to the overarching slide-lecture practice, and secondly considering concerns related to the associated practice of providing a handout.

2.3.2.1 Educational concerns

A raft of studies were carried out in the 1990's and early 2000's, when PowerPoint was relatively new to the lecture theatre, to examine the impact of the introduction of PowerPoint into courses as an alternative to OHP's and chalkboards. Owing to the wealth of literature on this topic, Levasseur & Sawyer (2006) carried out a meta-analyses of comparisons of learning outcomes in PowerPoint and other types

of lecture. In these comparisons, the general consensus is that although students preferred PowerPoint lectures to traditional lectures, there was no significant difference in learning outcomes as a result of the introduction of PowerPoint. Yet there was a small amount of support for its effects in improving comprehension, specifically in science subjects (for example Shapiro, Kerssen- Griep, Gayle and Allen, 2006). Levasseur & Sawyer's (2006) review of the literature reveals four general findings in relation to PowerPoint's power in the classroom:

1. Students are generally positive towards the use of PowerPoint in lectures; (e.g. Mantei, 2002, Susskind, 2005, Szabo and Hastings, 2000). However it is argued that novelty effects might be responsible for this finding, which, given the age of the review, would presumably be negated by PowerPoint's ubiquity today.
2. The majority of studies reviewed found no significant differences in learning outcomes when PowerPoint was used compared to traditional visual displays. (e.g. Szabo and Hastings, 2000, Bartsch and Coburn, 2003).
3. Students' learning styles impacted on the benefits that they would gain from receiving a PowerPoint lecture rather than a traditional lecture, with 'visual learners' receiving the most benefits from a PowerPoint lecture.
4. Slide design plays an important role in the satisfaction of students in the learning experience, with simple slides performing better than elaborate (e.g. Bartsch and Coburn, 2003).

It seems that although students might prefer PowerPoint lectures, they do not necessarily 'learn' more in these than they do in other kinds of lecture.

However it should be noted that 'learning' in these studies was generally defined in terms of how much students could remember in post-tests, and so these

studies tell us little of the students' participation in the learning experience. Another point of concern regarding such studies is that it is not clear what kind of information was conveyed by each different visual technology, for instance whether the chalk-and-talk condition included graphical displays or other visual representations. One study that does specify the types of slide information examined suggests that PowerPoint might be damaging to learning. Bartsch & Cobern (2003) compared performance on ten quiz questions following a traditional OHP lecture, a PowerPoint lecture (basically a PowerPoint version of the transparency text) and an 'expanded' PowerPoint lecture in which pictures and animation schemes were included. They found that the 'expanded' slideshow produced worse performance on the quiz and so suggest that including many non-relevant items might distract from learning.

Perhaps it is not surprising that the electronic version of the OHP slides performed similarly to the physical version as the materials were the same. Yet it is interesting that the expanded PowerPoint slides performed less well. This finding highlights a further difference between OHP and PowerPoint lectures; that PowerPoint slides can be and often are filled with much more information overall than can an OHP (for instance multimedia). Indeed as OHP transparencies cost money, lecturers presumably are encouraged to keep their usage to a minimum. However this difference might be responsible for the general preference for PowerPoint amongst students who report that slide-lectures are more entertaining than OHP lectures (Szabo and Hastings, 2000), owing to the multimedia affordances.

Amare (2006) reasoned that although they are different media, PowerPoint and OHPs are both, nevertheless, versions of slides. Thus she compared PowerPoint lectures, not to the traditional OHP lecture, but to the older chalk-and-talk lecture, in which she annotated on a chalkboard. Again she found that students preferred the

PowerPoint lecture, but she noted that performance was actually better in the chalk-and-talk condition. She gives several reasons for this difference, including that her lecturing style favours the chalk-and-talk lecture format. Yet it is possible that a break from the PowerPoint format, which was already widespread in 2006, could have presented a novelty to her students, which may be the cause of the differences in test scores.

Although such comparisons appear to provide essential insights into slide-lectures, it has to be acknowledged that there are inevitably limitations to any design that treats 'PowerPoint' as a simple independent variable. The studies described above employ designs in which the impacts on learning of one variable (PowerPoint) are compared against another (OHP or chalk-and-talk). However there are many extraneous variables that come into play within both 'variables', for instance the inclusion of multimedia, the provision of handouts, and the amount of text appearing on each presentation, the lecturers presentation style and so on. Treating PowerPoint and OHP as singular and self-contained variables, then, poses a serious methodological flaw meaning these kinds of comparisons are not entirely compelling.

Nevertheless, perhaps owing to its minimal impacts on learning as identified by these studies, more and more lecturers seem to be resisting PowerPoint based on observations of its use within their own teaching contexts. Indeed in relation to teaching, it has recently been pointed out that 'While [PowerPoint's] core purposes and strongest selling points -simplifying information and making learning entertaining -are highly valued by students and instructors alike, they also pose serious dilemmas for educators'. (Hill, Arford, Lubitow and Smollin, 2012, p. 8). According to their survey of student and lecturer perceptions of the use of PowerPoint in lectures there were three dilemmas relating to it;

1. The possibility for clarification versus a concern that PowerPoint leads to oversimplification,
2. That PowerPoint captures interest but might lead to a discouraging of in-depth engagement with the content,
3. That lecturers feel the need to provide slides in order to satisfy the students' requirements and to ensure positive course evaluations, yet also feel that it is pedagogically ineffective to do so.

Moreover, Adams (2006) provides one of the most thorough discussions on the impact of PowerPoint on 'classroom culture'. Adam's observes that the defaults of PowerPoint 'suggest' certain practices to lecturers. For instance, the default template advises that the slide be composed of a title followed by bulletpoints, meaning this is what most lecturers do. She argues this format favours a particular form of knowing, i.e. that which can be easily transformed into bulletpoints in a PowerPoint slideshow. To illustrate this, she cites the case of the lecturer Nass, himself quoted in Parker, (2001), who admits, disturbingly, that he actually removed a particular textbook from his syllabus because its discursive nature prohibited its transformation into a linear slideshow. Although to some extent, linearity was a feature of lecturing before PowerPoint, the PowerPoint program and its slideshow settings make this linearity more overt (Kinchin, Chadha and Kokotailo, 2008). For instance, there is no requirement that OHP transparencies should be displayed in a particular order whereas the PowerPoint program suggests that once one slide is dealt with, the show must move on. Thus the typical slide-lecture favours linearity in teaching. For this reason, Adams also argues that the PowerPoint program 'invites' or 'seduces' lecturers into a particular form of communication which can be conceived of as the 'presentation model' as opposed to the 'conversation model'. The conversation model

of teaching encourages dialogue between lecturer and student. Whereas theoretically, teaching involves the student in negotiating the knowledge to be accepted perhaps through conversation (though perhaps not always in a lecture situation), in a presentational model, information is given to students with little opportunity for discourse. This model identifies PowerPoint as a 'transmission' based pedagogical tool.

For Adams then, the slide-lecture is conceived of as a sales pitch; the lecturer throwing out knowledge to the student to be accepted and learned, which precludes discourse (Adams, 2006). This 'pitching' is achieved by using the linear bulletpoint style to hammer home the points being made, which, Adams claims, is more suited to the boardroom than the classroom (Adams, 2006). Although such presentation can be similar with OHPs, it is the space limitations of PowerPoint which emphasize this short, snappy sales-pitch style of teaching.

Adams is not alone in worrying about the impacts PowerPoint is having on pedagogical communications. It is also suggested that PowerPoint turns the lecturer into a stagehand, or an 'annoying distraction' to the slideshow (Craig and Amernic, 2006). Indeed as Craig and Amernic point out, luminescent slideshows are often given in a darkened room, and as a consequence everyone's focus is on the screen, making the slide rather than the lecturer the most important aspect of the lecture. This centrality of the visual aspect of the lecture is said to contribute to the 'society of spectacle' (Gabriel, 2008, p. 256), where visual stimuli serve to fascinate the eye, yet preclude deeper thought and reasoning. Moreover, the use of PowerPoint is said to be counter to more 'human' unmediated teaching available in lecturing pre-PowerPoint (Craig and Amernic, 2006). They claim therefore that, 'immediacy behaviours' (that is behaviours which serve to endear the student to the lecturer, and potentially

improve the learning experience (Titsworth, 2004)), that were once possible in the unmediated lecture, are now hindered by the low light required for slideshows which prevents the lecturer and audience seeing each other (Craig and Amernic, 2006). This prevention of immediacy behaviours might be exacerbated in the enormous lecture theatres which are now becoming typical of the university landscape, in which the front of the lecture theatre is dominated by a large display screen, several times bigger than the lecturer himself. In this way, the slideshow becomes the centre of attention for the student.

Gunderman and McCammack (2010) also present some of the disadvantages of the use of PowerPoint. They suggest that not only can the resulting lectures vary in quality owing to technical inequalities; they also cause:

- Reduction of complex ideas into short bulletpoints;
- Encouragement of the use of acronyms and abbreviations;
- Cultivation of a transmission style of pedagogy that promotes linear thinking;
- Weakening the significance of certain points over others;
- Causing the neglect of other educational technologies; and
- Giving the false impression of logical structure.

Indeed, the above bulletpoint list demonstrates some of such arguments clearly. In addition, the slide-lecture practice has been blamed for reducing standards in both teaching and learning as a result of lecturers simplifying their resources (Klemm, 2007). Further the style of presentation it advocates does nothing obvious to challenge a model of teaching which favours ‘transfer of conception’ over other more constructivist models, such as ‘shaping of conception’ or ‘growing of conception’ (Craig and Amernic, 2006, p. 153). Through using slide-lectures then, Adams

questions whether lecturers are ‘short-circuiting the tacit, mimetic and dialogic dimensions of the teaching-learning relationship’ (Adams, 2006, p. 409) and instead creating a relationship of givers and receivers of knowledge. Thus the slide-lecture might be considered to favour a transmission model of educational communication, rather than the pragmatic interaction and experience advocated in this thesis. This transmission might be exacerbated by the provision of handouts of the slide-text to students, which is examined in the next section.

2.3.2.2 Slide-lecture handouts

No evaluation of slide-lectures is complete without a consideration of the associated practice of the use of printed handouts of the PowerPoint slides. Where there were slight improvements in learning outcomes of the studies reviewed by Levasseur & Sawyer (2006), it was reasoned that this was probably as a result of providing the slide handout rather than the use of PowerPoint in the lecture *per se*. The slide handout clearly has implications for learning, and thus it is an important consideration in examining the slide-lecture.

There has been much evidence highlighting the virtues of the provision of lecture handouts (including those created pre-PowerPoint), such as in aiding note-taking (Kiewra, 1985) and providing a resource for revision and further study (Hartley, 1976). In relation to PowerPoint handouts in particular though, the evidence and opinions are mixed. In addition to the possible improvements in learning outcomes identified in the studies examined by Levasseur and Sawyer, Susskind (2005) found that students perceived that their learning outcomes would be better in a PowerPoint lecture condition owing to improved self-efficacy as a result of the efficiency it provided for their note-taking. Similarly Revell and Wainwright (2009)

found that students liked the structure that handouts provide for the lecture material, which helped them to prioritise information.

However, James, Burke and Hutchins (2006) also examined the perceptions of both lecturers and students towards PowerPoint and its handouts and found them contradictory. Although they found that students and lecturers thought PowerPoint and handouts were useful for note-taking and attention holding, students were actually less enthusiastic about PowerPoint's influence on learning during the lecture than their lecturers were, as they found slides to be rather boring. They suggest that lecturers are labouring under the misconception that students prefer PowerPoint lectures. Yet they suggest that slide-lecture handouts could be useful if they are used differently in order that students are motivated to use them as a planning tool in advance of the lecture, rather than seeing them as a 'regurgitation' of the lecture experience. The extent to which this happens is not clear.

Although promising of beneficial impacts on the learning of lecture material, slide handouts are thought to have negative impacts on lecture pedagogy. This negative effect comes as a result of students becoming reliant on the slides as a chronicle of the lecture (Adams, 2006). Here, students assume that everything they need to know is on the slides and because of this they simply replace actual lecture attendance with downloading the slides. This practice is blamed for subsequent reduction in exam performance within students (Weatherly, Grabe and Arthur, 2003). Even if the student does attend lectures though, Brazeau points out:

> 'The ability to effectively listen and organize concepts in a lecture format is a critical study skill since it is often the major pedagogical component in our programs. The disadvantage of extensive handouts, in this case, is that it tends to relieve the

> student of having to take meaningful notes and to later build from them a complete picture of the material. Students too often have the tendency to rely entirely on the handouts since they come from the instructor and must therefore be complete.' (Brazeau, 2006, p. 2)

By providing ready-made notes then, lecturers might be robbing their students of the option of deciding what is noteworthy, and making the effort to summarise it in a meaningful way. Therefore this model of teaching has been widely criticised for being a boring[4], flat delivery of the lecturer's notes to the student.

It seems that handouts are an important but potentially contentious issue. Although, on the one hand, they relieve students from the arduous task of taking notes for revisiting later, on the other hand this can bypass a potentially 'meaningful' learning process. This issue exists for OHP lectures as well as slide-lectures, yet arguably it can be exacerbated by the availability of the PowerPoint handout electronically. Note-taking and its processes in slide-lectures are discussed further in section 2.6.1.

In summary then, it seems that although slide-lectures might provide some benefits to lecturing, specifically in terms of practical affordances, their effectiveness in educational terms is still contested. It is clear that there is much resistance to the use of PowerPoint in educational settings and there appear to be many reasons not to use it. These concerns, although generally not empirically supported, are worth keeping in mind within any examination of PowerPoint and its interactions with HE

[4] It should be noted that the notion of 'boredom' here is not intended to be synonymous with effectiveness of teaching, yet it is acknowledged that it at least plays a role in the conditions required for effective teaching and learning according to the pragmatic conception of learning.

teaching and learning as these arguments add to the conception of the slide-lecture being a unique and potentially damaging type of communication.

It is imortant to note however that in relation to the kind of learning advocated in this thesis, it is possible that the positivity towards PowerPoint felt by many students in comparative studies is a salient factor to consider. If learning is considered to be an active and dynamic interaction between lecturer, student and resources, it seems important that students are encouraged to participate in this interaction. It appears that PowerPoint might provide conditions under which this encouragement might be achieved. I would therefore suggest that PowerPoint does provide possibilities for encouraging learning in lectures, if only because students prefer to be in a PowerPoint lecture to other types of lecture. This preference might provide the motivation, not only to attend but to also engage with the lecture experience. However, I acknowledge that simply adding PowerPoint to lectures is not enough, and that it is the *way in which it is used* which has the biggest impact on the lecture experience. Indeed, Young (2004) cites a survey of lecturers that revealed a 'strong feeling' that in the majority of cases the use of PowerPoint is poorly executed, resulting in a dull experience in the classroom. Although the same might be said of any kind of spoken delivery in the classroom, some commentators have invoked the common accusation of the slide-lecture in particular causing 'death by PowerPoint' (Taylor, 2007, Felder and Brent, 2005, Harden, 2008). Here the audience is driven to a comatose state by being bombarded with slide after slide of text along with an extended spoken exposition. Harden (2008) even suggests the existience of PowerPoint diseases, including 'PowerPoint Phobia', 'PowerPoint Stress Disorder', and 'PowerPointlessness' On a more serious note, it seems that the main issue concerning PowerPoint is that it leads lecturers into a particular style of presentation,

and therefore a particular style of lecture. It makes sense to examine this style in more detail. The next section examines what we already know about how slide-lectures are presented through considering the experiences of lecturers in giving slide-lectures.

2.4 The slide-lecture in practice

As opposed to what might be termed a pre-visual technology lecture, in which the lecture involves an interaction between speaker and audience only, the presence of the slide in a slide-lecture involves an interplay between speaker, audience and the slide in a 'performative triangle' (Nelson, 2000, p. 415). The assumptions behind this performative triangle description are based on the slide containing visual objects which are resources in and of themselves which the lecturer needs to talk about. In describing the PowerPoint as a performance, Gabriel writes:

> 'PowerPoint then becomes the latest prop to assume the "part of the individual's performance which functions in a general and fixed fashion to define the situation for those who observe the performance" (Goffman 1959: 32), while the ability to project images and pictures (including photographs, cartoons, paintings and drawings), along with graphs, diagrams and even lists, allows lecturers to take advantage of their audiences' visual sensitivities and visual skills. PowerPoint could then be said to embed itself in organizational performances at two levels — a theatrical one, in which it functions as a symbolic prop, and a more technical one, in which it helps the construction and dissemination of knowledge in particular ways.' (Gabriel, 2008, p. 269)

PowerPoint slides then are a form of 'prop' for the lecture, and what seems important is that both the lecturer and the audience need to understand the meaning of these 'props'. Therefore it is the lecturer's job to explain them to the audience. Further Knoblauch (2008) views the PowerPoint presentation as a performance which is situated in a 'socially mediated time and space that contributes to the creation of meaning' (Knoblauch, 2008, p. 76). Thus, whatever is on the slide needs to be examined and explained by both the lecturer and the students.

Although PowerPoint provides the option of including a range of multimedia, in today's slide-lecture practice it is a common practice to include text bulletpoints which contain key points around which the lecturer will elucidate. This practice is implicated in a 'triple delivery' model in which the words are said on the screen, by the lecturer and also by the hand-out in front of the audience member (Parker, 2001). Here the lecturer does not use the slide object as a 'prop', rather the slide objects might be used in some other way. It seems that there might be different approaches to the slide-lecture performance, depending on what the slides are being used for. It is important then to consider how lecturers use the slide format.

2.5 The PowerPoint style of lecturing: the lecturer's experience

Much practical advice is given on how to create and plan slide-lectures, for instance, Collins (2004) recommends building the presentation around the learning objectives, rehearsal and involving the audience as much as possible. Holzl (1997) presents 'Twelve tips for effective PowerPoint presentations' which include developing a storyboard, using sound and video for specified purposes only, advice on what kind of font to use, and choosing images that enhance the presentation message. Much of the advice seems directed at slide design, rather than how they might be

presented during the lecture so currently, there is little established protocol regarding how the slide should be spoken about in a slide-lecture which is made up mainly of text outlines of the lecture interspersed with various multimedia. Despite this lack of advice, there is much criticism of the 'typical' way in which such speaking about the slide is achieved. For instance, the PowerPoint 'paradigm' of teaching is assumed to result in the lecturer replicating the lecture from the PowerPoint (Adams, 2006, Maxwell, 2007) 'since the sequential point-by-point explanation of course materials is the most natural way to convey information' within this type of lecture (Olliges et al., 2005, p. 65).

As a result of the repetition of slides by speech, the PowerPoint lecture has been described as merely a 'ritual exposition, an expansion around a set of points that have (at least in theory) already been encountered digitally prior to the lecture as an embodied event' (Gourlay, 2012, p. 204). Thus the lecturer's notes are seemingly provided to be used as a guide to the lecture by both the lecturer and students (Tufte, 2004, Craig and Amernic, 2006, Tufte, 2003, Norvig, 2003, Young, 2004, Maxwell, 2007). Here, the slides become a text based outline of the lecture performance, dictating the topics which the lecturer will talk about and which students should study further. This might also be responsible for the tendency of some lecturers to read slide-text verbatim, a practice which is said to produce 'dull' lectures (Young, 2004). This view condemns the lecturer to the role of spokesperson for the slide. Yet it is not established whether or not this 'spokesperson' role is a fair characterisation of what actually occurs in HE lectures.

It seems that these criticisms of the PowerPoint performance point to a specific style of lecturing which is thought to be characteristic of a slide-lecture. Yet, although Adams presents a convincing argument about the invitation made to

lecturers to 'fall into' this particular style of teaching and presenting, Vallance and Towndrow (2007) counter that it is only the 'undiscerning' lecturer who is steered by PowerPoint into its particular practices. Indeed they agree that most lecturers play around with the default structure, adding photographs, videos and other multimedia, and bending the slides to their particular will. Some writers describe particular methods of interacting with slides in a presentation which seem contrary to the pervading practice. For instance Maxwell views the relationship between the speaker and their PowerPoint presentation as a tour guide who should guide their audience around the objects on screen (Maxwell, 2007). In Maxwell's case, this argument is put forward in a practical paper in an attempt to encourage the movement away from the use of text in slide-lectures, as he advocates an approach to slide-lectures in which the contents of the slides are predominantly photographs[5].

Yet practitioner case studies like Maxwell's are few in the literature. Thus although some lecturers might be attempting slide-lecture revolutions, it seems that there has previously been little interest in examining their practices by empirical work. It can be assumed then that in slide-lectures, the pervading 'language of presentations'(Tufte, 2004, p. 5) is still the list of bulletpoints which might encourage a default style of lecturing, in which the slides are used almost like a script for the lecture. Either way though, the slide-lecture can be considered not as two separate streams of information in isolation, but as an event in which the streams are mediated by each other. The next section examines how this mediation might be achieved.

[5] Although admittedly focussed on the practices of Historians, his practices have relevance elsewhere where the goal of the instruction is to induce students into thinking about particular contexts of significant events.

2.5.1 Mediating the relationship between speech, slides and audience

It seems that the slide-lecture performance involves the lecturer addressing items appearing on the slide. The most obvious way to do so is by pointing to it. In fact it is common for lecturers to use forms of physical pointing, and Knoblauch (2008) provides an account of the types of physical measures that speakers can take to point out slide objects, for instance using their finger, a stick or a laser pointer. Yet as lecturers in large lecture theatres are usually positioned far away from the screen any physical pointing is likely to be ambiguous (Bangerter, 2004). Admittedly new technologies might offer a means to point efficiently to information on the screen, such as using 'digital ink' technologies to highlight the item on the slide being spoken about (Anderson, McDowell and Simon, 2005). However, these technologies are by no means widespread and, as such, cannot be relied upon by the audience as a means to navigate the slide. Physical pointing techniques aside then, how do lecturers signal to their audience that they are referring to an object?

It has been suggested that when a speaker is not within close range of the referent, (in this case, the slide) they will increasingly rely on the use of language to point (Bangerter, 2004). Thus the lecturers' speech in some way must point out the information that is being spoken about. Of course, lectures can use the linguistic acts of deixis[6] to point these out, for instance in saying 'this diagram' or 'here is a graph'. These instructions are fairly obvious when there is only one diagram or graph on the screen. However, when there are multiple diagrams or graphs it might be less clear. Further, when the item being referenced is a text bulletpoint within a list of bulletpoints, how is this specific pointing out achieved?

[6] That is, a linguistic means of uncovering the context of the information, or its point of reference.

Knoblauch's (2008) observations of slide presentations advises that speech can point to the slide-text by exhibiting a dual structure; the speech and slide both tell us about the objects and their spatial pattern. According to Knoblauch, this involves such practices as the speech explicitly mentioning the structure of the slide, for instance in saying 'on the right hand side' (Knoblauch, 2008, p. 80). He also suggests that it can be done elliptically by which the audience is not receiving a clear direction to the information, for instance 'aside on the left' (Knoblauch, 2008, p. 80). However, in a lecture situation, one would not expect lecturers to give direct instructions for which bulletpoint to look at for each point by saying 'look at the third point down' and such like, it would be time wasting and tedious. Rather Knoblauch suggests that although slide-text mediation can be carried out in explicit ways, such as through deixis and structural speaking, it can also be achieved in more subtle ways through referring backwards and forwards to the slide-text and also reading out the words that appear on screen.

This explicit/ subtle dichotomy might suggest different approaches to the mediation of slide-lectures which seems worthy of further exploration. Indeed through investigating the extent of the 'pointing out' done through keywords in relation to bulletpoint lists, Schnettler (2006) identifies two distinct approaches to 'orchestrating' the PowerPoint performance. These are the 'Orators' and the 'Performers'. Orators are those who 'only use the computer image (slides) as a kind of silent, colourful wallpaper in the background' (Schnettler, 2006, p. 160). Further, they may spend a long time providing a commentary on the list, without actually pointing to any of the items on it. Performers, on the other hand, make 'extensive use of and is interacting frequently with both the visualisations on screen and the audience.' (Schnettler, 2006, p. 160). This type of presenter spends less time on any one slide or point in the list.

Schnettler also hints at the audience's response to different types of performance. In the case of the Orators, 'the audience may recognize the progress of the argumentative (or narrative) sequence, orienting occasionally to the list while listening to the orator, especially when recognizing that a certain utterance matches with some part of what is written on the wall.' (Schnettler, 2006, p. 160). If we consider how these types of presenters would utilise pointing practices in their mediation of the slide, in occasionally matching 'what is written on the wall', the orators might be using the more subtle means of pointing. However, since the performer uses their slide as a kind of wallpaper, a performer might not even use any explicit or subtle means to guide the audience to the object on screen. Thus it could be argued that those receiving either types of presentation would find the task of identifying the slide-element being spoken about rather difficult.

This potential difficulty raises important questions about the students' position in a slide-lecture. What needs to be kept in mind is that both students and lecturers have to negotiate between the different streams. It is possible that the negotiation of the streams produces a unique form of academic discourse, and as a result, new learning practices. It is necessary then to identify what we already know about this specific form of discourse in relation to learning. The next section then considers the students' position in the slide-lecture.

2.6 Receiving a slide-lecture: the student's experience

Schnettler's research appears to be unique in its consideration of the nature of the relationship between speaker, slide and audience, and further, his analysis of the extent to which pointing is achieved focussed only on the 'performer' approach to slide presentations. Thus it is not possible here to compare one approach to the other

in terms of possible impacts on learning as identified by the literature. There is however a large body of literature that examines the slide-lecture in general in terms of learning implications, without necessarily considering the mechanics of the presentation (see section 2.3.2). In considering the student's reception of the slide-lecture here then, it is not the intention to consider what or how much they learn from it. Rather it is advantageous to consider literature relating to what students *do* in response to slide-lectures, and through this consider whether the slide-lecture experience is conducive to the engaging learning environment which is advocated by this thesis.

2.6.1 Note-taking

Arguably, the main response that students have to the lecture is to take notes on what the lecturer is saying. There is a long history of the practice, and as outlined in Chapter 1, students were once expected to transcribe their lecturers' speech (Friesen, 2011). Later, Isaacs' (1994) survey of lecturers perceptions of note-taking identified that the main functions that lecturers feel should be performed by students' notes includes;

1. the provision of a basis for further study;
2. to provide a record of the lecture content;
3. to help students stay alert during lectures;
4. to outline the structure of the lecture (Isaacs, 1994).

In explaining how note-taking helps the learning process, Kiewra et al (1991) outline two note-taking functions: encoding and storage. Here the physical act of note-taking helps with encoding the information and the notes produced (and also the memory of producing the notes) facilitate storage. The term 'function' appears to be

used to describe different things here, with Isaacs using it to describe what the notes can physically be used for, and Kiewra et al using it to describe what the process of taking of notes does cognitively for the student. However, taken together, it seems that the literature suggests that note-taking can be considered to help students to process (encoding function) and remember (storage function) content and structural information covered in the lecture that they can use to direct their further study and revision practices. Thus note-taking is thought to be an important aid for learning from lectures.

Chapter 5 provides a more thorough discussion of note-taking practices, yet it is important to note here that one potential issue relating to students' note-taking practices in slide-lectures in particular is their ability to attend to both the speech and the slide simultaneously in order to take notes. It is widely noted that managing student attention during lectures is an important ability of lecturers (Bligh, 2000, Young, Robinson and Alberts, 2009, Wilson and Korn, 2007, Risko, Anderson, Sarwal, Engelhardt and Kingstone, 2012), and especially so in slide-lectures in which there are competing streams of information (the slides and the speech) (deWinstanley and Bjork, 2002). Taking notes in a slide-lecture involves the difficult task of negotiating between listening to the lecture whilst simultaneously looking at the slides and writing down information from one or the other or both (Sutherland, Badger and White, 2002). As there are potentially three different sources for students to attend to simultaneously; the speech, the slides and their notes, it is important to question how student attention is managed in a slide-lecture.

2.6.2 Paying attention

The second major activity of students during lectures is their management of their attention. Although there are multiple streams to attend to, it is suggested that

slide-lectures are beneficial to student attention. For instance Farkas (2007) values slide-text for displaying a lasting reminder of the lecture structure to students in contrast to the more transient presentation of structure which is provided by speech alone conditions. Indeed, once it is said, the student cannot re-hear it. The appeal of this is presumably the ease with which students can refer back to the structure if they lose their place in the speech.

However, Savoy, Proctor and Salvendya (2009) tested experimentally whether more information is retained from the PowerPoint lecture or a chalk-and-talk lecture, which can be used as a measure of where the students attention was during both formats. In engineering and psychology lectures they tested retention of information which was given solely visually or verbally in each condition. Interestingly, they found that information that was presented orally in the presence of slides was more difficult to recall than that which was presented orally in the chalk-and-talk condition. This suggests that processing in the verbal channel is damaged more in the PowerPoint condition than in the chalk-and-talk condition. Thus the presence of a slide might negatively impact on the students' ability to attend to the lecturer's speech, as whilst they pay attention to and process what is on the slide, they do not (or perhaps, cannot) attend to and process the speech simultaneously. Although it is possible that slides have an effect over and above the simple overloading of channels. Wecker (2012) similarly tested students attention in slide-lectures experimentally. He compared retention of information presented orally in a condition using 'regular' slides (that is, slides that contain a lecture outline in full sentence bulletpoints) versus a condition using 'concise' slides (that is, slides that contained minimal text and short phrases) and a condition not using slides at all. He found that regular slides have a similar 'speech suppression effect' which could not be explained by a simple case of

'cognitive overload'. Rather, he concludes that students in the regular slide condition were disproportionately allocating their attention to the slides rather than the speech, and further this effect might be enhanced in those students who perceive a high importance of the slide.

Of course the lecturer might be considered as a guide to the slide-lecture; they take the students through the slides, and so they dictate when a student will attend to one stream or a particular object. Yet studies of human attention suggest that we will automatically attend to new things happening in our visual field, with so called 'selective attention to novelty' (for example, Berlyne and Ditkofsky, 1976, Arnheim, 1969). So it might be assumed that whether or not the lecturer has yet given the instruction to look, the student will attend to new things appearing on the screen over the speech. Moreover, as described in section 2.5.1 this 'instruction' to look or not look seems to be a slippery concept. If students are to engage with *both* streams of the slide-lecture then, it is important to consider the impacts of dual streams on their capacity to do so, i.e. the demands placed on their processing channels. The next section does so through examining theories of visual and verbal processing.

2.6.3 Putting the streams together

The final major activity that students are involved in during slide-lectures is assimilating the information from speech and slide together into a single narrative. How this occurs can be explained by considering the CTML. The conditions of visual and verbal representation that occur in slide-lectures are largely those that are ideal for cognitive theories of learning, such as the CTML. Such theories highlight the importance of combining visual and verbal 'modes' of communication to facilitate learning (e.g. Chandler and Sweller, 1991, Mayer, 2005a). Here the student sorts incoming modes through different sensory channels into an internal verbal account,

meaning that there is an internal dialogue between the student and the information. It is thought that internal cognitive processes will then be actively involved in translating between the modes to establish their meaning (Jewitt, Kress, Ogborn and Tsatsarelis, 2001). Jamet & LeBohec (2007) suggest that when presented with multimedia documents containing speech, text and visual representation (in their case a diagram) the students' 'cognitive management' strategy involves different processes for the three different streams of information. They are;

- For the speech: Listening, and selecting important information
- For the text: Searching the screen 'in order to find a heard sentence in the written text', before reading it
- For the visual representation: identifying the referential links between the text, verbal, and visual representations (Jamet and Le Bohec, 2007, p. 596)

Thus it seems that the combination of speech with text and with other visual representations is considered to have different impacts on the students' cognitive processes. These are examined in the following sections.

2.6.3.1 Processing speech + text

When comprehending text, it is suggested that in searching for relevant information from the text to answer questions, the efficiency of the search process depends on both the demands of the task (high complexity or low), and also the extent of comprehension. Here poorer comprehenders perform more erratic and chaotic search patterns and good comprehenders use efficient text searching strategies (Cerdan, Martinez, Vidal- Abarca, Gilabert, Gil and Rouet, 2008). However, this finding applies to comprehension of a text document alone and does not reveal much about search processes when students are also listening to speech that might or might not match the text, such as in a slide-lecture. Applied to text search in slide-lectures

then, it might be that those students who have not understood the relationship between the slide-text and speech use less efficient strategies to search for the relevant information in the slide-text (and vice versa) than those who have comprehended well.

Even if the speech does match the slide-text, it is still unclear how students' cognitive processes in assimilating the two are helped or hindered. Kalyuga (2012) points out that research into the cognitive effects of hearing the same text that is displayed on screen is limited. Of the small body of literature, Kalyuga reports on Moreno and Mayer's (2002) studies which conclude that reading out simultaneously displayed written text is beneficial to processing when the written text is split into chunks with breaks in between them. Thus reading out a bulletpoint in a slide-lecture, if followed by a break, might be beneficial to student processing. However, in a lecture situation, this affordance for breaks between segments is not typically provided, as the exposition comes in a constant stream. The talk moves on whilst the text is displayed on screen, and yet more text continues to appear. Thus Kalyuga concludes that reducing on screen text and explaining it in detail is more beneficial than displaying long sentences and reading them out (Kalyuga, 2012).

It seems then that the displaying of slide-text and speech simultaneously presents a complex task for both the lecturer and the student. For the student, the task is to understand two types of verbal information: the text and the speech. For the lecturer the task is to manage the speech and text in order that there is a temporal match between them. The extent to which lecturers achieve such a match is unclear, yet it seems important to the students' experience of the slide-lecture. Thus the matching of speech to text forms a specific focus of the current research. Yet it must be pointed out here that slide-lectures do not solely contain speech and text modes.

Owing to the visual modalities afforded by PowerPoint, it is important to consider whether more visual modes might offer lecturers and students a less complex option for assimilation than does text.

2.6.3.2 Processing speech + multimedia

Multimedia teaching and learning has been much discussed recently, and has been claimed to be more effective at encouraging meaningful and engaging learning than traditional text and speech based practices (e.g. Mayer, 2001, Chandler and Sweller, 1991). Before considering how multimedia might interact with speech though, it is necessary to outline what is meant by multimedia, as Schnotz (2008) argues that conceptions of the term tend to get confused in the literature. Schnotz outlines three levels of multimedia;

1. The technical level, which concerns the technical device used to display multimedia signs, for example, a PowerPoint slideshow;
2. The representational level, which concerns the signs that are used, for example photographs or text;
3. The sensory level, which concerns the sensory modality which receives the sign, for instance the eyes or the ears.

As Schnotz asserts, distinguishing between these levels is important, as effective multimedia learning is facilitated when the 'display of the learning content are adapted on the representational level and the sensory level to the functioning of the learners' cognitive system' (Schnotz, 2008, p. 18). He also points out that those interested in multimedia learning often ignore such distinctions.

When considering the levels of multimedia in a slide-lecture then, the technical level is the PowerPoint slideshow and the representational level is the

'mode' employed to convey meaning. According to work on multimodality, meaning can be constructed from interacting with any 'mode' such as image, gesture, tone of voice, even colour, rather than just through language and text (Jewitt et al., 2001). Thus the sensory level can be altered by what is displayed on the slideshow. Since the choice of delivery mode during lectures now includes not only verbal and text based material, but also multimedia, including images, audio and dynamic graphics (animations, video etc.) (Mayer, 2001), our teaching and learning environments are more equipped to provide a multimodal and multi-representational education. As the slide-lecture can contain both multiple representations and multimodal 'signs', the affordances for multiple representations and multimodality are considered to be its pedagogical major strengths.

Although relating to different aspects of the multimedia setting then, the terms multimodality and multiple representations both relate to the presence of different types of information within the same multimedia message, and both point to the educational effectiveness of such combinations (e.g. Ainsworth, 2006). Yet recent directions in multimodal analysis highlight the importance of the student making transformations of multimodal materials, in particular, visual communications in addition to language for learning (Scollon and Wong-Scollon, 2009). For instance, research on the use of visual resources during science lessons asserted that simply drawing a diagram of a heart was meaningless to students without some description of the elements (Pozzer-Ardenghi, 2007). But importantly, a verbal description of the elements without a diagram was similarly meaningless. Thus Unsworth and Cleirigh (2009) suggest that text and image are reliant on one another for meaning making. As a caption can make sense of what is happening in a photograph, so too can the photograph enhance the text to give a more detailed understanding of the concept

represented by both. So text and image ‘interact synergistically in the construction of meaning’ (Unsworth and Cleirigh, 2009, p. 154).

For multimodal learning then, it is important that students are able to transform and assimilate the mode(s) of communication given by the lecturer into meaning (Jewitt et al., 2001). In relation to slide-lectures in which text and multimedia can be displayed together, it seems that assimilating visual and verbal representations into one narrative is important for effective meaning making. But how is this assimilation achieved?

Schnotz (2005) proposes an integrated model for this text and picture processing. In this model, although text and picture information enters consciousness through different channels, they are ultimately processed together in order to build conceptual understanding. Therefore the internal narrative account of the information does not discriminate one modality from the other when building up an understanding. Instead, visual and verbal information are processed simultaneously in order to build ‘propositional representations’ and ‘mental models’ of the concept to which they relate (Schnotz, 2005, p. 57). When seeing visual representations, such as photographs and hearing (or reading) related verbal information together, the different representations should be assimilated into the building of a mental model to create one schema for the concept. Owing to the possible limits on what can be processed in each channel at the same time (Mayer, 2005a), it seems important to consider the extent to which the slide-lecture is conducive to this assimilation. It seems that without this crucial process, students will be hindered in their ability to understand the lecture material in order to have a meaningful engagement with it.

In summary, the student's task in the slide-lecture appears to be highly complex. There are several stimuli competing for their attention, and it is possible that this competition will influence their ability to assimilate the information coming from both streams. Combined with the complexities involved in the lecturer's mediation of the slide-lecture, these observation paint a concerning picture regarding the potential for slide-lectures to facilitate the kind of learning experience endorsed by this thesis. Moreover, this review has identified that there is much about the slide-lecture as a distinct form of pedagogical communication that is still unknown and ill-defined. It seems that many questions are left open to the study of slide-lectures, so the next section will outline the particular questions that are addressed by this research.

2.7 Research questions

I have argued that the lecturing landscape has changed significantly with the adoption of PowerPoint. Although it would be expected that the methods of lecturing would remain roughly the same, the balance has almost certainly shifted towards the utilisation of text based visual resources in lectures. Considering the pervasiveness of PowerPoint in lecturing practice, particularly in the discipline of psychology, it is the intention of this research to examine the slide-lecture practice in psychology teaching further. Clearly PowerPoint has an important role in undergraduate lectures and as such its effectiveness at achieving learning outcomes requires much research and consideration in order to come to conclusions as to the best, or rather least disruptive approaches to its use. However, as the needs of different audiences, topics, universities, and lecturers and so on are diverse in nature, such generalised 'best practice' conclusions will be difficult to justify. What might be a more productive approach, however, is building an awareness of the practices that using PowerPoint in lectures might generate. As slide-lectures produce a novel type of communication in

lectures, it would be beneficial to examine and understand this type of communication. In doing so, it would be possible to consider the communication practices typical of slide-lectures in relation to the adopted theory of learning in order to assess their suitability for a meaningful teaching and learning environment.

Chapter 1 outlined the aims of the research. In light of the literature surrounding the slide-lecture, these aims can be revised to take into account what questions are still open for examination. The revised aims of the research then are to consider;

1. The nature of the slide-lecture *as a form of communication*
2. The teaching and learning experiences *created by this form of communication*
3. Creative approaches *to the mediation of the form of communication* for both teaching and learning.

Thus the research questions are directed at these aims. This review has outlined the existing knowledge in relation to considering these aims, and has identified some specific questions that remain open. The following sections summarise these gaps in the existing literature, along with the specific research questions aimed at filling these gaps.

2.7.1 The nature of the slide-lecture as a form of communication

The practice of using a PowerPoint presentation during lectures is unique and distinct from its predecessors: namely, presenting OHP's and writing on chalkboards. As opposed to the traditional lecture in which students would come to hear the lecturers' expositions and take notes, the emerging practice of slide-lectures is one in which the PowerPoint outline of lecture material is capable of being made available electronically to students before or afterwards and is presented during the lecture.

When interrogating the slide-lecture then, we cannot look at slides and speech as separate entities, as this is not how they are intended, or how they are performed, although it might be how the student perceives them.

Slides are an integrated part of the performance, in which integral roles are played by the presenter's speech, audience reactions, the paper handouts of the slides given out to the audience, and, the technology used to display the slides. However, studies comparing slide-lectures to OHP lectures do not tell us anything about the way in which the slides are performed by the lecturers. It may well be that in writing on the chalkboard or OHP the lecturer more explicitly integrates the information being written with their speech, through pausing to write it, or to change the OHP transparency. Following from this, if the text is already written and the lecturer only needs to press a button for it to appear, the integration of that text into the lecture performance might be less explicit. Although there is a small body of research that considers the way in which slides are performed, and one identifies two distinct styles of performance (Schnettler, 2006), such studies do not consider the *extent* to which this integration is performed, and whether the extent of integration reveals different ways of approaching the integration of slide with speech. Thus the first question asked here is: **to what extent does the lecturer's spoken exposition integrate with the written text in slide-lectures?**

2.7.2 The teaching and learning experiences created by this form of communication

Currently there is little understanding of the role of the inter-relationship between the speech and the slide in slide-lectures. Is the slide to be used as a visual resource to provide visual examples? Is it the script of the lecture or some form of skeleton which needs to be fleshed out? Does it signal whether the point of the lecture

is to pick out information that the lecturer wants to talk about, or does it signal that there are certain parts of the speech that need backing up with a visual representation? Or is it simply there as a more permanent record of the lecture for use by the students? It could be all of these things depending on how it is treated by the lecturer with their speech. Yet there are two participants of the slide-lecture who might each assign different roles to the slides. There is the lecturer who is giving the slide-lecture, whose intentions for its use may be shaped by certain motivations and philosophies. Also there is the student audience which receives the lecturers' speech and slides, whose conceptions of the role of each are shaped by certain assumptions. Thus both the lecturers and the students understanding of their roles within the slide-lecture are likely to shape the learning experience. The research aims to contribute to thoughts on the roles of the slides and speech streams in a slide-lecture for both parties. Thus the research considers not only how verbal and visual elements are combined, but how lecturers envision their interaction to be used, and whether their differing levels of interaction might impact on learning experiences of the student. The second question asks: **what experience do lecturers intend to create in the design of their slide-lectures and how far do they succeed?**

2.7.3 The options available for creatively re-mediating approaches to the form of communication for both teaching and learning.

It is clear that different processes are utilised in response to text and multimedia information. For this reason, multimedia and text-based representations are treated separately throughout this thesis. Multimedia is generally considered beneficial in instruction and learning, and may even be preferable to text. This benefit is important in the slide-lecture context where both multimedia and text representations might be employed alongside each other. It is possible that in a slide-

lecture, a well-positioned image may be assimilated more effectively with the speech than do text bulletpoints. Thus it seems important to establish how best to incorporate multimedia representations with verbal elements in slide-lectures in order for this blending to occur. Specifically, there is little evidence of how PowerPoint has impacted on the interactions between speech and multimedia that occur during lectures. For instance it is not clear how the integration of multimedia elements can help the spoken element of the lecture, and if the mode or representation employed may help or hinder the story that the lecturer wishes to tell. Thus a third aim of the research is to consider the integration of multimedia representations within slide-lectures as a potential alternative to the integration of text. The third and final research question posed is: **can the slide-lecture be creatively re-mediated through the integration of multimedia to encourage engagement?**

2.8 Intended contribution to knowledge

The overarching research aim, and therefore the contribution to knowledge of the research, is a consideration of whether the slide-lecture can be re-mediated to improve the students' learning experience in undergraduate psychology. In other words, what are the possibilities for integration of the speech and slide material by the lecturer to afford a meaningful learning experience? To do this the research investigates how slide material is integrated into the spoken expositions of psychology lecturers in order to identify the role of each within the slide-lecture. It also considers the possibilities afforded to students by different types of speech-slide relationship along with the difficulties inherent within each, through an investigation of student reactions to slide-lectures. The research addresses the three questions outlined in order to build up a response to this objective. In addressing these questions, it is intended that the thesis will contribute to knowledge about the

communication practices employed in slide-lectures in undergraduate psychology. It is intended that the literature on slide-lecture pedagogy will be enriched by a description of these practices, and also an examination of both the lecturers and the students' perspectives in relation to a slide-lecture experience. Specifically, it will provide an account of what lecturers do in terms of communication during slide-lectures, what thinking lies behind these practices and what learning experiences come as a result of these practices. The next chapter outlines the methodological approach taken to address these questions.

Chapter 3 Methodology

3.1 Introduction

The present research intended to examine the slide-lecture as a specific form of communication and instruction. It was the intention first to describe the slide-lecture communication practices in undergraduate psychology, then to explore the motivations behind and reactions to the practices and, finally, to consider options for creatively re-mediating these practices in light of the selected conception of learning. This chapter outlines the methodological design with which this examination was achieved.

This chapter begins in section 3.2 with an outline of the theoretical framework for the research and an outline of the approach taken. Then there follows an outline and consideration of the research design in 3.3. The research took place over two phases, so the methods used for data collection, and the approaches employed to analyse each phase of data collection are outlined separately (section 3.4 and 3.5). Finally, the chapter considers issues relating to measures that might ensure quality of the research and its ethical implications (section 3.6 and 3.7).

It is worth reiterating here the research questions that guided the research, in order to explain how the research was designed. The three overarching questions for the research were;

1. To what extent does the lecturer's spoken exposition integrate with the text in slide-lectures?
2. What experience do lecturers intend to create in the design of their slide-lectures and how far do they succeed?

3. Can the slide-lecture be creatively re-mediated through the integration of multimedia to encourage engagement?

3.2 Theoretical framework

Before outlining the selected research design, it is necessary to outline the conceptual context of the decisions made in relation to the research design. Thus the first section below outlines the underlying assumptions that guided the research, from the choice of research paradigm and epistemological positions, to the methodology employed.

3.2.1 Research philosophy: epistemological concerns

The examination of multimedia learning and teaching situations often implies a quantitative approach to data collection, perhaps designing a set of measures with which to test subjects' learning or cognitive capacity in different conditions of instruction. Indeed, much of the research into multimedia learning employs such experimental designs employing quantitative analysis (e.g. Moreno and Valdez, 2005, Brünken, Steinbacher, Plass and Leutner, 2002, Moreno and Mayer, 1999). However, it was not the aim of the thesis to consider learning outcomes through quantifying student performance, and, as such, an experimental design comparing so called 'measures of learning' in different lecture conditions was not an option adopted. Further, it was not the intention to measure cognition in different conditions of teaching and learning. Rather, an approach that addresses the lecture 'experience' as one which results from a dynamic interaction between lecturer, student and resources was needed. The intention was to examine and document the quality of the slide-lecture interactions, and their resulting 'experience', in order to identify which aspects are important for further consideration. In short, before different slide-lecture

conditions can be compared, the interaction that is created by lecturers and the experience it provides for students must first be characterised. Selecting such an approach required a consideration of the options available from the qualitative and quantitative research paradigms.

3.2.1.1 Negotiating the research paradigms

The qualitative/ quantitative debate is a long standing tension in educational research; open any research methods textbook and there is sure to be included a chapter or chapters devoted to outlining the differences between the two approaches. There is no intention here to provide an account of these differences, and as Johnson and Onwuegbuzie (2004) point out, there are many commonalities between the research paradigms. For instance, they both value an empirical consideration of research questions, the process of describing, explaining and speculating, and the quest to minimize any confounding biases in the research process. Further, they suggest that both paradigms accept a few universal principles;

- that 'reason' is a variable construct;
- that all observations are made through particular theoretical lenses;
- that multiple theories can explain a single phenomenon;
- that even the choice of research question or hypothesis is situated in a particular context;
- that any conclusions made might only be true in the immediate context (the problem of induction);
- the situated nature of research;
- that research is never value free (Johnson and Onwuegbuzie, 2004, p. 16).

As a result, research often combines aspects of the two paradigms. For instance qualitative researchers might introduce some level of quantification in their analysis, which Bryman calls ‘quasi-quantification’ (Bryman, 2008, p. 598) through the use of terms which hint towards a numerical dimension such as ‘ frequently’, ‘some’ and ‘often’. Additionally, quantitative research might include some qualitative element to the method, for instance, including open questions in a survey. Such a desire to mix approaches to the examination of an issue conforms to the theoretical foundations of a mixed method approach (Biesta, 2010).

Undoubtedly, it is true that different methods can be used to examine different aspects of the same story, potentially making the outcome of a mixed methods study more compelling. Thus it was considered that a mixed methods framework would be ideal for examining the three questions, which each seek to examine three different aspects of the slide-lecture story. Question 1 sought to describe practices employed during slide-lectures. A mixed approach would allow such characterization at a qualitative and quantitative level, meaning that these descriptions would be exhaustive. Question 2 sought to examine responses to the slide-lecture in order to explain the slide-lecture practices. Such explanative work necessarily involves examination of multiple issues, which requires many different analytical approaches. Again, a mixed methods approach would allow such an examination of multiple issues. Additionally, question 3 aimed towards suggestions for re-mediation of slide-lectures using multimedia in order to solve issues raised by questions 1 and 2. This question involves two processes, firstly the description of the practices surrounding multimedia, and secondly an examination of the experiences of such practices. For the same reasons given for adopting a mixed approach for questions 1 and 2 then, a mixed approach would also be optimal for addressing question 3. Thus a mixed methods

approach was adopted for the research, allowing the combination of design approaches and methods from both qualitative and quantitative traditions, in order to examine different facets of the slide-lecture. The next section outlines the mixed method approach, before section 3.3 outlines how it was put into action.

3.2.2 The Mixed Method Approach

The mixed method approach to research is relatively new and still evolving. As such, definitions of the approach vary significantly (Tashakkori and Creswell, 2007). The current approach is largely based on the theoretical framework of pragmatism, which Johnson and Onwuegbuzie (2004) argue rejects philosophical dualisms and dogmatisms of the quantitative versus qualitative debate in favour of a 'best of both worlds' approach. In this approach the researcher can pick and choose which methods and assumptions would work best for the situation.

However, it is argued that a mixed methods approach is more than simply selecting the methods that work best towards answering the research questions. Rather, mixing methods in research can serve to 'draw from the strengths and minimize the weaknesses of both [qualitative and quantitative paradigms]' (Johnson and Onwuegbuzie, 2004, p. 14-15). On a fundamental level, it is argued that the ideas behind the qualitative and quantitative paradigms are not too dissimilar, yet distinctions between the two tend to be rather crude (i.e. quantitative = measurement, qualitative = interpretation) (Biesta, 2010). Biesta argues that 'measurement is itself a form of interpretation' (p. 101) and as such the distinction does not stand. It seems that the qualitative/ quantitative dichotomy in research is questionable, and instead of deciding on one approach or the other, one needs to look beyond these distinctions to the underlying purpose of the research. For the current research, rather than explaining (a typically 'quantitative' pursuit) or understanding (a typically

'qualitative' pursuit) (Biesta, 2010), the purpose is to do both in order to question the phenomena of slide-lectures. A mixed methods approach provides the ideal environment in which to explore the issues relating to slide-lecture pedagogy.

The editors of the Journal of Mixed Methods Research provide an authoritative definition of the approach, although they invite discussion on it. According to Tashakkori and Cresswell (2007), the mixed methods approach is 'research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry. A key concept in this definition is integration' (Tashakkori and Creswell, 2007, p. 4). However, as Tashakkori and Teddlie (2010) point out, a mixed methods approach is far more integrative of the two paradigms than simply using, for instance, an interview following an experiment. Rather they argue it involves a 'mixed model' of research which combines the worldviews of the qualitative and quantitative traditions. Thus according to these seminal authors in mixed methods, a 'truly mixed' approach involves combining the paradigms during the initial planning stages, including positioning and identification of the problem. This combining proceeds through the implementation (data collection), analysis, and finally through the writing process and the drawing of conclusions. Additionally, a mixed model of research can involve a transforming of the data from one type to the other during the analysis. Perhaps the most important process in a mixed methods study then is the integration of the data during analysis (Fielding, 2012).

Fielding proposes 'three broad reasons for mixing methods' during analysis: illustration, convergent validation, and analytic density' (Fielding, 2012, p. 127). 'Illustration' here means to enhance a quantitative finding with, for instance, a quote from qualitative data. Convergent validation means the extent to which the findings

from different sources come to the same conclusions, and ‘analytic density’ means to get a deeper understanding of the data and emerging findings through combination. The objective here is to put the findings from the different methods into a dialogue with each other through systematic data integration (ibid). As the outcomes of illustration and convergent validation merely serve to back up one set of data with another, Fielding suggests that analytic density is the most judicial reason for using a mixed methods approach. In this way, researchers should aim to be iterative in both the data collection and analysis, with one informing the other. Thus, in order to be a truly mixed approach, the analytical process must merge qualitative and quantitative data produced by both qualitative and quantitative methods into a single analytical thread, rather than treat them as separate strands of the analysis. The benefit of this is that it ‘allows researchers to proffer more complex and more nuanced results’ (DeCuir-Gunby, Marshall and McCulloch, 2012, p. 206), through triangulating data from a variety of sources.

So mixing methods is more than simply doing qualitative and quantitative stages of data collection. Rather a mixed methods approach can provide a pragmatic and transformative means of exploring research questions. The approach makes use of the most compatible aspects of both qualitative and quantitative research paradigms and, crucially, integrates these throughout the entire research process. With this conception of the mixed methods approach in mind, the following section details the research design.

3.3 Research design

As mentioned, the research design was a mixed methods examination of slide-lectures, aimed at exploring three facets of this unique form of pedagogical

communication. In order to address the first question, a naturalistic observation of lectures was planned, as will be detailed in section 3.4, to enable the description of slide-lecture practices. However although this observational technique would allow the description of practices, it would not allow an exploration of the practices and their resulting experiences which form the focus of research question 2. For this question then, a series of mini case studies was also planned to examine the identified practices more closely, as will be detailed in section 3.5. Through these case studies it was also intended that research question 3 could be addressed. Specifically, it would be useful if when investigating issues regarding the slide-lecture experience, the possibilities for solutions for these issues and possibilities arising from them for the creative re-mediation of the slide-lecture could be discussed simultaneously. Thus the research was designed to take place over 2 distinct phases, with the first phase aimed at addressing question 1, and the second phase aimed at questions 2 and 3.

The design carries features of both an ethnographic design and a case study design. However it does not claim to adopt these designs in their true senses. For example, ethnography is thought to involve the researcher entering the research with little or no pre-conceived ideas about what they will find, and to instead be open to 'finding' what the research situation suggests (Goldbart and Hustler, 2008). As identified in Chapter 2, this research was based on some pre-determined conceptions about what is important to examine about the situation of slide-lectures. Additionally, a case study design by nature is an in-depth study of a single case or small number of cases (Stark and Torrance, 2008). The extent to which an in depth examination of one or two cases can tell us about commonalities in slide-lecture experiences is limited, so it was intended that multiple cases would be considered. Thus the research design can

be considered to be based on an ethnographic and case study design yet employs these terms loosely.

Both of the designs necessitate the selection of a sample of participants, as Mertens (1998) highlights, it is simply not feasible to study all cases relevant to the research. It was necessary then to identify some slide-lectures from which to draw a sample. In an ideal world, all different types of lecture contexts would be sampled. However, it was considered that the examination of one particular context would yield more comprehensive results than would such a broad overview of many different contexts. Thus a cross sectional approach was employed to survey lecturers within the selected population of undergraduate psychology lecturers.

3.3.1 Defining the population

As the research considers the use of slide-lectures in HE, specifically in undergraduate psychology, much thought went into the decision regarding what kind of psychology lectures to sample. The first year of an undergraduate degree in psychology, like many subjects, is often aimed at giving the students a background level of knowledge upon which to build during the second and third year curricula. Importantly for psychology, students often need not have studied psychology at any level before studying it at university. Therefore, the first year psychology student population typically has widely different levels of prior knowledge, which needs to be addressed before further development can occur. As such, first year lectures in psychology are very much introductory, as little prior knowledge is needed to understand them as a standalone lecture. So in sampling them it should not be necessary to visit several lectures, or a whole series, in order to extract a representative lecture format. The population from which to derive a sample for the

research therefore included lectures in first year undergraduate psychology, the lecturers responsible for them, and the students attending them.

3.3.2 Research outline

The research consisted of two distinct research designs aimed at the three research questions. Accordingly the data collection was separated into two distinct phases, each with a different combination of methods, which enabled the research questions to be addressed separately. 'Phase 1' of the research, involved the collection of a corpus of videos of lectures. As stated, this phase aimed towards addressing research question 1, which calls for the description of slide-lecture practices. It was thought that by audio-visually recording slide-lectures, the resulting data could be revisited again and again in order to carefully consider the relation between speech and text. Capturing several lectures in this way would enable the identification of commonalities in practices, and as such a general description of the communicational context of slide-lectures could be put forward.

Once such practices had been described, the second phase would be employed in order to examine the practices in further detail, in terms of the intentions behind them and the lived experiences of them. 'Phase 2' aimed towards firstly examining the experiences of both students and lecturers in relation to slide-lectures, and through this examination, to uncover possibilities for their creative re-mediation through the use of multimedia. These examinations require more immersion in the slide-lecture than the video-recording of lectures can allow, so the design for Phase 2 included interviews and document collection in order to gain insights from the participants of slide-lectures. Yet it was identified that the collection of videos of lectures would also be required, in order that the insights regarding practices could be triangulated with

the lecture practices identified. The following sections detail these two phases separately.

3.4 Phase 1: An examination of slide-lecture practices

In order to define slide-lecture practices, and therefore address the first research question, I needed to develop an approach that enabled a structured investigation of these occasions. Observing lectures was the most obvious means in which to examine the practices employed. Thus a naturalistic approach to the collecting of lecture data was taken; which involved observing lectures that were occurring naturally, without any interference by the researcher.

3.4.1 Method: Non-participant observation of lectures

Depending on the analytical methods carried out, and the extent to which behaviour is recorded, an observation can be used to describe and 'understand the culture of a group and peoples' behaviour within the context of that culture' (Bryman, 2008, p. 403). Observation can be a more ecologically valid approach to examining and describing social practices than, say, a questionnaire or experiment. The validity might be further influenced by the level of participation of the researcher in the social practice, for instance a participant observation would involve much influential behaviour on the part of the researcher (Mertens, 1998). Measures taken to protect validity are discussed further in section 3.6.1, though it is necessary to state here that it was accepted that the researchers' influence on behaviours and action is significantly reduced in a non-participant observation. Thus a non-participant observation was considered the most fruitful approach to describing slide-lecture practices. Consequently, the behaviour needed to be recorded objectively (i.e. video-recorded) but, further, the recording needed to be made of a natural lecture situation,

i.e. not produced solely as a requirement of the research process. It was decided that video-recordings would be made of real slide-lectures occurring in undergraduate psychology courses across the UK in order to describe their practices.

3.4.2 Sampling

A carefully considered sample was needed in order to generate a reasonable number of participants which would represent the population of first year undergraduate psychology lecturers. Through such a sample, the description of slide-lecture practices could be reasonably generalised amongst the identified population. It was decided that selecting a single topic would be a productive approach to obtaining this sample, as it would allow a comparison of some of the different ways of dealing with the integration of slides with the spoken exposition when the topic remained the same. So a topic needed to be selected.

Despite British Psychological Society (BPS) guidelines on core subjects to be included on accredited courses (BPS, 2010), there is, nevertheless, great variance in the individual topics covered within these subjects at each stage of a psychology degree across UK institutions. Therefore the selection of a single topic was not straightforward. It needed to be canonical so that it could be assumed that it would be covered almost everywhere in some form and extent. Yet it also needed to be a discrete topic which could be covered during a single lecture, in order to record the whole 'story' that the students would receive on the topic.

Discussions with a selection of colleagues in the field of psychology highlighted a handful of topics which might be potential fits for these criteria, from which the topic of 'Attachment Theory' (as introduced by Ainsworth, 1979 and, Bowlby, 1953, for example) was selected based on personal interest and perceived

prevalence of the theory in undergraduate courses. Attachment Theory is a classic first year lecture, as it is a fundamental theory to get to grips with. The topic is canonical and therefore there would be much standard material being covered. Yet it was considered that there would be much variance in the way that this topic would be delivered, owing to differing university policy, resource, inclinations, specialism and so on, not to mention individual lecturers' preferences and practices. Also, it was considered that the topic was compact enough to be introduced in a single lecture. Because of this compact nature, observing a collection of videos of single lectures on Attachment Theory would allow sufficient comparability of the different approaches taken by lecturers, without taking into account differences in prior teaching on the subject. Thus I could be reasonably confident that research question 1 would be adequately addressed, i.e. I would create an extensive corpus from which the slide-lecture communication practices relating to text could be identified.

Once the topic had been selected, it was then necessary to identify lecturers in psychology departments who would be teaching Attachment Theory; information which is not easily discovered without first having contact with the department. Fortunately, both my main supervisor and I had crossed paths with a number of such academics during our careers. So a list of around 18 colleagues working in psychology departments who might assist the search for participants was drawn up relatively easily. It was hoped that if they could not themselves participate, they may have been able to introduce me to the Attachment Theory lecturer in their department. Further, it was thought that personal connections would be least likely to overlook a humble request, and so with the help of these sympathetic souls, it was possible to contrive an initial population from which to recruit a sample of Attachment Theory lecturers. Out of the 18 departments approached then, 4 had already given their

attachment lecture and 2 were unwilling to participate. Thus 12 lecturers who fit the criteria (i.e. those who were teaching first year Attachment Theory lectures from universities across the UK, during the academic year 2009/10) were able to participate in the study (although data from only 11 of these was analysed in the research as explained in section 4.3.2).

These 12 lecturers were contacted via an email which outlined the project and included an invitation to participate outlining what would be required from them if they did. Volunteers were asked to provide the date of their Attachment Theory lecture and to consider the viability of making a recording at the lecture. No personal information was collected about these lecturers.

3.4.3 Video-recordings

The corpus of lectures was constructed through making video-recordings of lectures given by these 12 lecturers. To do so, lecturers were given the option of either making a recording of their lecture using a Vado sent to them in the post, or allowing me to visit and record the lecture myself using the same device. Only one lecturer requested that I come along to do the recording so the Vado was sent to 11 of the lecturers in advance of their lecture along with instructions for its use (Appendix 1). The instructions requested that the Vado was to be set up in a position which allowed the recording of the main display screen or focal point in the lecture theatre, along with the lecturer's speech, but not necessarily including the lecturer themselves (unless unavoidable). It was also required that no students were visible on the recording without their permission, and that students were made aware of the recording prior to the start of the lecture. Also included with the Vado was an addressed envelope in which to send back the Vado containing the recording after the lecture. In the one instance in which I was requested to make the recording, I attended

the lecture and sat near the front with the Vado pointed at the screen and made the recording.

3.4.4 Dealing with the data

In order for the approach to elicit a description of slide-lecture practices, an appropriate analytical approach was needed. Discourse analysis (DA) is the study of situated spoken texts in order to describe the conventions of speech in particular contexts (Coulthard, 1985). Using a DA approach would therefore enable the description of particular practices which are employed in slide-lectures when integrating (or not) the slide-text. In the case of the slide-lecture, the discourse can be considered to be the speech stream, which forms the lecturers 'commentary' (Schnettler, 2006) on the slides. Yet the slide also forms an integral part of this discourse. The practices of these lectures were analysed and described using a DA approach to examine both the speech and slide-text.

The lectures were transcribed, as a text is often more straightforward to work with in a DA approach than audio/ visual recordings, owing to its tangibility and the ease of scanning and marking a text for coding. These transcripts needed to reflect the slides and their transitions along with the speech. Thus slide transitions were used as markers to split the speech into sections, such that anything that was said whilst a particular slide was displayed was presented alongside that slide. This meant that where a lecturer changed slides mid-sentence, that sentence was divided between the slides at the point of transition. Any changes made to the slide during the time it was displayed were noted, for instance if a bulletpoint was added or a video was played. The specific procedures used to carry out the analysis are described in further detail in Chapter 4 .

The first stage of research, then, was carried out in order to collect an initial corpus of videoed lectures, to enable the description of slide-lecture practices relating to text. For Phase 1 a video-recorded, non-participant observation of a cross section of lectures was carried out. The second phase was designed to consider how both lecturers and students understood the integration of slides with speech revealed in Phase 1.

3.5 Phase 2: Giving and receiving the slide-lecture

Understanding of the different slide-lecture practices could be achieved by collecting not only lecture performance data, but data concerning perspectives of the individuals responsible for the lectures (the lecturers), as well as those who experienced the lectures (the students). Phase 2 of research was designed to collect data from these slide- lecture participants. This necessitated a different set of methods.

3.5.1 Phase 2 methods

To address the second and third research questions, I needed to talk to lecturers and students about their conceptualizations of speech-slide interactions. For this phase, I needed participating lecturers to not only make a recording of their lecture, but to commit to talking about the planning and design attitudes behind it. Further, as I wanted to explore the reactions of students to the designed presentation, I would also need to gather a reaction from the students who were at the lectures. This phase of research would therefore be exploratory in nature and, as such, methods of capturing the data would need to facilitate the acquisition of new insights and observations on slide-lecture practice. Qualitative interviewing was selected as a means to go about this exploration, owing to the opportunities for gaining an understanding of the lecturer’s perspectives. The specific methods are detailed in

sections 3.5.1.2 to 3.5.1.6 below. Firstly though, the sampling procedure needed to be revisited to ensure the sample would meet the requirements of the research questions.

3.5.1.1 Sampling

Again, first year undergraduate psychology was revisited for the same reasons as it was chosen for the first phase, but also for continuity within the thesis. However, there are a finite number of lecturers who teach first year Attachment Theory in the UK, so gaining a further sample from this limited population would be difficult, so the topic-as-anchor approach was discarded for this phase. Additionally though, it was acknowledged that using the topic as an anchor in Phase 1 would reduce extraneous variables as a result of sub-field biases within Psychology, such as cognitive, developmental, evolutionary and statistical fields. It had to be also acknowledged that Attachment Theory may itself invite a particular approach to lecturing which might not be so present in lectures on other topics or fields. Keeping the topic static, then, would limit the types of things that can be done in a lecture. It was considered that it would be erroneous to draw conclusions about lecturing practice in psychology without having considered the very extraneous variables that I wished to avoid during Phase 1. Opening up the topic of study would allow an overview of many different ways of performing and experiencing the slide-lecture in psychology, and would bring with it the added bonus of opening up the potential pool of lecturers from which to draw a sample.

Yet capturing interest in the study would, understandably, be an accomplishment in itself given the rather intrusive nature of this phase of research. A further complication was the need to make personal visits to these lectures, meaning that the lecturers would generally need to be at universities within reachable distance of Nottingham. Fortunately, some of the lecturers from Phase 1 offered further help if

required, so these offers were gratefully accepted. Additionally, where recommendations had been given for other colleagues who might be happy to help out, these were duly followed up. It was still necessary to approach lecturers with whom I had no pre-existing associations, which was achieved through first approaching course leaders through their university websites and asking for willing participants. Through accepting offers of help, and contacting 17 universities within a few hours' drive of Nottingham, this approach enabled me to gather a further sample of 11 lecturers teaching a variety of topics within first year undergraduate psychology during the academic year 2010-2011. The remaining 6 contacts were either unsuitable for participation owing to timing of their lectures (2) or did not respond to the request (4). Each participating lecturer was consulted to establish a suitable first year undergraduate psychology lecture to attend.

Once the date had been agreed for capture of a suitable lecture, students were contacted by emails giving information about the research sent via their lecturer. Students were offered a £10 High Street voucher on completion of their participation in order to compensate for their time. In total 91 students responded, but owing to limits on the number of students who could be interviewed on the day, the first 5 students to respond to the email were contacted in each institutional context. From this group, up to 5 students from each class who would be available to participate immediately following the lecture were selected, resulting in a total recruitment of 48 students. Selected students were sent information about the study and about what their participation would entail (Appendix 2). Arrangements were made directly with these students regarding details of their participation.

Demographic information from the students, such as age or gender and so on, was not collected. There is no existing evidence to suggest that any of these

traditional variables are relevant to the research questions and so there was no specific motive for addressing them. For the purpose of this research, the only background information about the students that was collected was that they were all completing the first year of an undergraduate psychology course, and that they had all attended the lecture in question, as it was this experience which was crucial.

The data were collected during single day visits for each lecturing context. In advance of the session, lecturers were asked to supply their PowerPoint slides, or other visual materials that would be used during the lecture. The next sections outline the specific procedures employed during these visits.

3.5.1.2 Video-recordings

Again, video-recordings would be used to describe slide-lecture practices, but also it was considered that they would be useful to consider lecturer and student responses in relation to the particular occurrences to which they related. The first activity carried out at these lecture visits therefore was the video-recording of the lecture. It should be noted that owing to limitations of the device in clearly capturing the slide-text in one of the Phase 1 lectures, a High Definition (HD) Vado was used during this phase.

It was necessary to arrive at the lecture theatre just before the lecture began in order to find a suitable recording position to make a clear recording. This also enabled me to introduce the project at the beginning of the lecture, and establish consent for recording with the student audience. Again the recordings contained both the visual materials used during the lecture, along with the lecturers' speech; camera positions were chosen such that lecturers and students were not captured, unless exceptional movements made this unavoidable.

3.5.1.3 Lecturer interviews

As lecturers would be questioned about general lecture practice, along with specific incidents that occurred during their lectures, the method needed to be relatively flexible to allow different questions for different participants, yet provide some means of assessing a collective opinion. Bryman describes two different types of qualitative interview; unstructured and semi-structured (Bryman, 2008). In an unstructured interview the researcher has a topic in mind which is discussed with the participant according to what the participant finds important to talk about. This approach would not be suitable for the aims of this phase of research, as I had some specific questions in mind which arose from the process of analysing the Phase 1 transcripts. A semi-structured interview involves the use of some pre-prepared questions, with the flexibility to follow up on topics of interest highlighted by the participant. It was intended here to consider some core topics with the lecturer regarding slide-lecture pedagogy, but also to gain an insight into their own slide-lecture practices. Thus it was decided that semi-structured interviews would be carried out with lecturers, using a pre-determined interview schedule. This schedule (included in Appendix 3) was based on the questions emerging from an initial analysis of Phase 1 data, and questions relating to specific instances of the lecture attended.

Where possible, lecturer interviews took place immediately after student focus groups (described below), but this was dependent on the lecturers' availability. They usually took place in the lecturer's office, but in some cases they were carried out in a suitable meeting place suggested by the lecturer. Interviews were conducted following Bryman's (2008) key recommendation for successful interviewing; that of listening and being attentive to what the interviewee says and responding in a flexible manner.

Audio recordings were made of these interviews using a digital voice recording device.

3.5.1.4 Focus group interviews

As this thesis aimed to examine the texture of the student experience, rather than measure their learning outcomes, the methods used to capture student reflections needed to fit the exploratory nature of the investigation. Further, the number of students participating in the research, and the way in which they participated, was limited by some practical concerns. Firstly, the timing of their participation would be crucial. Owing to their lecture timetables and the possibility of their forgetting the lecture content, I needed to speak to students whilst the lecture was fresh in their minds. Secondly, as there was only one researcher interviewing students one-by-one following the lecture might cause differences in responses based on the length of time the student had been waiting to participate. By speaking to more than one student at a time though, I could achieve a balance of immediacy and efficiency. Moreover, I might also achieve a greater quality in the data owing to the possibilities for discussion between students: covering what they took from the lecture, as 'members of the group brought together in a suitable, conducive environment, and how this can stimulate or "spark each other off"' (Wellington, 2000, p. 125). It was thought that explanations may become more elaborate if students could differentiate their own reflections from someone else's. Moreover, it was thought that the instances of disagreements might be as equally a source of insight as instances of agreement. So the interaction between students would be useful alongside their individual reflections. Krueger & Casey's (2000) seminal book on focus group interviews suggest a number of situations in which a focus group might be an appropriate method. These include when the researcher seeks either a range of ideas and opinions,

insight into complicated or conditional opinions, or to shed light on data already collected. As all of these three aims were intended for this aspect of the research, it was felt that a focus group interview would be the most efficient and effective method to capture the student experience.

Krueger & Casey (2000) recommend that although 10-12 participants are common, smaller groups reduce the breadth of topics of examination. As in-depth observations of lecture experiences were required, it was considered that 5 or 6 student participants would be sufficient to run the focus groups. Further, smaller sized groups might carry the benefit of being easier to manage and participants would be less likely to be left out of the conversation.

A pre-prepared interview schedule (Appendix 4) was created following Wellington's (2000) suggestions, specifically ensuring that the questions reflected the aims of the research, that they were worded in an open, non-leading manner, that they were organised into a coherent structure, and that they were non-ambiguous. Also asked were questions that related to specific teaching incidents determined to be of interest during the lecture. These included instances of interaction, use of specific visual or text elements or about some particular speech-slide relationship where this could be determined. In asking these questions, it was not the intention to test whether the students answered correctly, rather it was intended that probing their responses would allow an insight into their engagement with the material.

Yet this schedule was not the only resource used during the focus groups. Focus groups are by nature events in which a group of people focus on a particular topic (Wellington, 2000). Further, as Krueger & Casey point out, as just talking can become tiring and it is easy for conversation to go off course, the inclusion of

activities in addition to questions might promote engagement and maintain focus in the interview (Krueger and Casey, 2000). As the students would all have been to the lecture, listing their recollections might be used as a focussing activity. I also wanted them to reflect on specific parts of the lecture. By showing students sections of the lecture again, it may prompt real time reflections on the interactions, or identify points which were missed by the student in the original lecture. Further, it is recommended that asking participants to 'think back' to particular instances improves the reliability of the responses gained. Thinking back requires responses based on specific instances, rather than general opinions, or thoughts about what 'might' happen in specific circumstances (Krueger and Casey, 2000).Therefore, the PowerPoint slide handouts and video-recordings of the lecture would be used as stimuli for discussion within the focus groups, as this would give a concrete experience to reflect on.

Slide handouts and video clips were used in a similar manner to a 'photo-elicitation' technique, in which images are used to elicit a 'different kind of information' than can be achieved using words alone (Harper, 2002, p. 13), i.e. focussed and grounded in an objective experience. Such a technique is thought to elicit potentially more valid observations and responses from participants, as they have a tangible artefact to refer to and so the interview is less open to bias resulting from differences in understanding between interviewer and interviewee about the topic in question (Harper, 2002). This method would be particularly useful for addressing research questions 2 and 3, specifically in examining the students' responses to slides. Thus in 7 of the 10 focus group interviews, the students were shown selected sections of the lecture recording, through a laptop and speaker system in order to stimulate discussion. In the remaining 3 focus groups, the recording was not available, as it had poor sound quality, or the laptop and speakers could not be

plugged in. In these cases the PowerPoint handouts were used to show students specific slides to discuss.

Where possible, focus groups were conducted immediately following the lecture with the participating students, but in two cases, these were arranged to take place sometime later in the day owing to lecture timetables. Students were invited to a pre-booked room within their university or to a quiet common area to participate in the focus group interview. Students were first asked to sign consent forms if they had not already done so, then to hand over the copies of their notes before the interview began in earnest. In carrying out the interviews, Krueger & Casey's (2000) recommendations about questioning were kept in mind; for instance, asking general questions before specific questions (students were asked about how they had found the lecture as an opening question, before moving on to considering specific slides/ occurrences). Further, uncued questions were asked before cued questions, allowing the participants to answer freely about a general question before asking them to consider certain perspectives or relevant experiences within their responses. These interviews were also audio-recorded.

3.5.1.5 Students' notes

Focus group interviews would give an account of students' reflections on their experiences following the lecture; however, I also wanted to gain some understanding of how students were engaged during the lecture. Observing students throughout the lecture would be impractical, and having them reflecting on the lecture as it progresses would have been too distracting for the students. However, it was reasoned that students already participate in some form of 'live' feedback on the lecture through note-taking. Thus making copies of their notes would allow access to the students' activities during the lecture in a naturalistic way. Given the two general

functions attributed to note-taking: external storage and encoding (Di Vesta and Gray, 1972), notes were considered to be a record of the information that students encode and that which they consider to be useful for later review. Collecting copies of students' notes could therefore allow some exploration of the impact that the slide-lecture has on the students' reactions, and the information that is encoded and stored by them for later retrieval.

In the emails to students, participants were asked to identify themselves to me at the start of the lecture in order to receive carbon-copy paper with which to make a copy of their notes. These students were instructed to note-take in their usual style, but to use the carbon-copy paper and plain paper to create a direct copy. Consent forms, and instructions for use and plain paper for copying were also provided.

3.5.1.6 Dealing with the data

The lecture visits inevitably produced a lot of data. There were more lecture video-recordings, student focus group interviews, sets of notes from each student attending the interviews, and also interviews with the lecturers. Table 10 in Chapter 5 outlines the data collected, but it is necessary here to outline how this data was transformed into a useable format.

Each of the lectures was transcribed in the same manner as those from Phase 1. Additionally, in order to preserve the validity of the lecturer and student interviews, these were also transcribed. A further decision needed to be made as to the level of transcription needed for these interviews. The purpose of conducting the interviews was to capture the perspectives of the lecturers and students experiencing the lecture. For this reason, a thematic analysis would be carried out. As this type of analysis looks for themes rather than specific practices in conversation (as in a DA approach),

it was decided that the nature of interactions between interviewer and participants would not reveal much regarding the experiences of slide-lecture integration practices. As such, interviews were transcribed to note only what was said while not paying specific attention to the details regarding the conversational contexts in which it was said.

As students' lecture notes contain much more than just written data, it was decided that transcribing would omit valuable information regarding the visual organisation of information and information depicted in more creative ways than written text. The students' notes were scanned to produce an electronic copy for analysis. All data were imported into NVivo 9 for the analyses, the procedures of which are described in the relevant chapters. Before detailing these analyses, it is necessary to outline the quality and ethics considerations which were made prior to the commencement of the research.

3.6 Quality considerations

Wellington (2000) points out that in order for the outcomes of educational research to have an impact on policy and practice, they need to be products of quality research. Quality judgements depend on the research paradigm employed, for instance the quantitative paradigm values approaches which support 'validity' 'reliability', 'replicability' and 'generalizability' whereas qualitative the paradigm values 'credibility', 'confirmability', 'transferability', and 'dependability' (Lincoln and Guba, 1985). Applying these criteria for trustworthiness to a mixed methods approach is difficult, as the judgements made depend on not only the individual methods used but also philosophical outlook of the researcher. However, O'Cathain (2010) suggests that this issue might be negotiated by three different approaches: using a generic tool

for assessing quality, assessing the quality of the different methods separately based on their paradigm, or a third, 'bespoke' approach. The third approach was more appealing here, as a generic tool does not take into account issues specifically related to mixed methods research. Further the individual methods approach would not apply to the present mixed method as the 'mixing' was based on the mixing of paradigms, as well as the methods of data collection.

The 'bespoke' approach is developed by O'Cathain, who describes the development of Tashakkori & Teddlie's (2010) model of 'inference quality' which takes into account methodological rigor and interpretive rigor. She outlines eight domains of quality which can be used to judge mixed methods research. Mixed methods researchers need to take measures to ensure quality in planning, design, data, interpretation, transferability of inferences, reporting, synthesizability and utility of the findings. These include questioning;

1. the rationale for the research;
2. whether the research design is appropriate for the questions;
3. whether the methods are sufficiently justified;
4. whether the interpretations are credible;
5. can the inferences be applied elsewhere;
6. was the design justifiable in light of the findings;
7. can the results be used in practice? (O'Cathain, 2010).

Clearly some of the questions relating to quality have already been addressed in describing the approach and design of the research (1-4). Further, some involve a retrospective examination of the study on its completion (5-6). However below are outlined some additional measures that needed to be taken from the outset to address

issues of quality. These are broken down into measures that address the criteria of validity and reliability, which although termed differently within the two traditions, are nevertheless considerations for both qualitative and quantitative research.

3.6.1 Measures to ensure the validity of the research

3.6.1.1 Naturalistic observation

As the research sought to describe emerging slide-lecture practices, a naturalistic examination of lectures was needed. The collection of lecture videos for Phase 1 was designed to this end; the lecturers would have been given anyway, so there was no manipulation of the situation. However, that is not to say that the research did not impact on the way in which the lecture unfolded. Further, it was acknowledged that my presence in the lecture theatre during Phase 2 data collection would be an abnormal occurrence and, therefore, may cause atypical behaviour in both the students and lecturers. In order to preserve authenticity of the lecture experience, I took care to remain as unobtrusive as possible during the lectures. This was achieved by sitting amongst the audience, where possible, in order to reduce my visibility. Additionally, the recording device needed to be relatively inconspicuous, so as not to put off the lecturer or cause any behavioural changes in the student audience. Vado video cameras were chosen based on their small size. These devices have limited functions: so are easy to use, and they could easily be sent through the post to the lecturers to record the lecture themselves during Phase 1.

In addition, lecturers were reassured that the research did not intend to judge their practice; rather the intention was to describe it. Further ethical issues regarding video-recording and measures taken to address them are discussed in section 3.7. It

was hoped that in employing these measures, lecturer participants would feel little need to change their behaviour.

The research did not seek to measure learning outcomes, but to consider students' reported reactions to the slide-lecture. One of these reactions would be expressed in their note-taking, as these records reveal the material that students consider being 'note*worthy*' and, thus, the information to be used in further private study. Collection of students' notes was also naturalistic; as direct copies were made of the notes as they were produced so there was little manipulation of the situation. Students would have made notes anyway and they were allowed to write in their own styles. However, it has to be kept in mind that students' notes are private documents and, as such, the participants might worry that their notes would be read by someone else, specifically their lecturer. They therefore might have departed from their normal note-taking practice. In order to prevent this, student information sheets were circulated that described the confidentiality of the notes, the people who would have access to them (my supervisors and I) and also instructions that they should take their notes as usual.

3.6.1.2 Management of questioning and stimulus vs. memory

Student interviews were planned to examine reactions to the lecture, which relies on the student being able to remember the lecture. Showing the lecture again in its entirety would have produced real time reflections on the lecturing practice. However, this would have been potentially disengaging for students and would take much more time to carry out. It was hoped that by using clips from the videos, students would be given an adequate reminder of specific occurrences of interest in the lecture. The use of short clips would leave more time for discussion during the focus group, which also needed to be carefully managed to ensure validity. For

instance, following Kruger & Casey's (2000) recommendations, questions were carefully worded so as not to be leading, and the interviews did not investigate sensitive or controversial topics. Additionally, the management of the focus groups was carried out in order that each participant was able to provide their views and was not led by a single forceful voice.

Lecturer interviews carried less concerns related to validity, as these were designed to give more general opinions and attitudes towards slide-lecture practice. When specific instances were discussed, it was assumed that the lecturer, having produced these instances, would have adequate memory for them and so would not need to be reminded in the same way that students might. Thus lecturer interviews did not use any stimuli, other than the pre-determined questions and the more *ad hoc* questions.

3.6.2 Measures to ensure reliability

Questions of reliability focus around whether or not the research could be carried out in the same way by another researcher, and come to the same conclusions. As such, many of the issues relating to reliability concern the way in which the research is described and analysed. As the analysis of lectures used some unique approaches, the methods of analysis needed to be carefully considered.

The extent and approach of the slide integration practices was expected to vary between and within lecturers and, and as such, the potential for errors and inconsistencies in the judgement of instances of integration was expected to be high. For this reason, the analyses which considered these integration practices were subject to reliability checks through the involvement of a second external coder. Reliability checking is usually carried out on the coding of quantitative observations, to ensure

consistency between different coders (Coolican, 2004). This necessitates the creation of a well-defined coding schedule which can be understood and used by different coders on the same data (Bryman, 2008). On completion of my own coding of the lecture data then, a coding schedule was written, for another researcher to use to analyse the integration of text with speech (Appendix 5), and to examine the speech acts performed (Appendix 6). Also, descriptions of the functions of photographs and images, as outlined in Table 19 (Chapter 6) were provided for the analysis of the integration of photographs and images with speech.

Although analyses were carried out on all lecture data, it would not be necessary for the additional coders to do the same. It was decided to allocate 10% of the data to the additional coders to analyse using the coding schedules. This sample was produced by randomly selecting 10% of the total slides of interest used by the lecturer. The additional coders were given the selected slides and the accompanying speech to analyse, along with the specific instructions relating to the type of data to be analysed. How these reliability checks were carried out for specific analyses is detailed in 4.5.1.2 and 4.5.4.1(for text) and 6.3.4 (for photographs and images).

3.6.3 A note on the generalizability/ transferability of the research

As outlined in sections 3.4.2 and 3.5.1.1, the sample was carefully considered, keeping in mind the potential generalizability of the findings. Therefore issues regarding generalizability will not be repeated here, though it must be stressed that the sample was derived from a very specific population of lecturers in undergraduate psychology. For this reason, no claims are made about the generalizability of the research findings further than the population of first year lectures in undergraduate psychology. Nevertheless, the two samples were considered to be ‘opportunity samples’ of lecturers, as the participating lecturers were not selected by any further

criteria. Furthermore, the samples consisted of lecturers at a range of stages in their academic careers, each with different specialisms and interests. As such, the samples might be considered to be representative of the cross section of lecturers teaching psychology.

3.7 Ethical considerations

As Wellington states, 'ethical concerns should be at the forefront of any research project and should continue through to the write up and dissemination stages' (Wellington, 2000, p. 3). Thus the considerations made in relation to research ethics were kept in mind from the very start of the planning stages, and are outlined below.

3.7.1 General ethical considerations

Ethical approval from the School of Education was confirmed prior to carrying out any data collection for this project. In order to secure this approval, the research design was informed by the guidelines of the British Educational Research Association Revised Ethical Guidelines for Educational Research (BERA, 2004). Specifically;

- all participants were asked for voluntary informed consent before any data was collected;
- the study did not involve deception of participants;
- participants' right to withdraw was respected;
- any tokens of gratitude for participation offered were carefully considered and their distribution recorded;
- Efforts were made to ensure that participants did not experience any detriment from their participation in the research (e.g. that students were not distracted from learning during their lecture)

- Data was handled carefully to ensure its confidentiality, for instance being stored on a password protected database, and, also all data were anonymised through the use of pseudonyms to avoid identification of participants.
- Efforts were made to report fairly and accurately on the data during the writing process.

In addition to general ethical research practice, the ethical implications of the specific methods were considered carefully, and arrangements were made to ensure that these methods met the BERA guidelines also. These arrangements are outlined in the following sections.

3.7.1.1 Video-recorded lectures

Video-recording of lectures is a delicate operation, as lecturers might feel uncomfortable if they do not know what will happen to the videos once collected. For the preliminary corpus of lecture videos, these issues were discussed informally via email communications with all of the lecturers. To alleviate any unnecessary anxiety, lecturers were reassured in these emails that their lectures would not be judged in terms of their content or pedagogical quality, rather that emerging practices would be examined and described. In the email communications, lecturers were given information about what the study would entail, and given ample opportunity to ask questions regarding the use of their data. Moreover, lecturers were not under pressure to participate, as they would be doing the filming themselves and so could participate or withdraw at will. Thus lecturer consent to participate was assumed by the act of their making the recordings. Any issues raised during Phase 1 along with their solutions were included in communications with lecturing participants for Phase 2. During Phase 2 then, lecturers were again fully informed of the purpose of the data collection and the researcher's intentions. They were also given ample opportunity to

raise any issues or withdraw from the study. Lecturer consent was acquired verbally prior to the beginning of the lecture and interviews.

Yet the use of video-recording devices may have carried extra ethical considerations, owing to the greater potential for individuals to be identified. Where possible, recordings only captured lecture materials and spoken expositions, without capturing any students or the lecturers themselves visually. However, visual capture of the lecturers was occasionally unavoidable, for instance, when they walked in front of their slides. In order to prevent the identification of lecturers, lecture transcripts created from these videos were treated with confidentiality in mind. For instance, where a lecturer was visible in the video or their name or other identification appeared in the slide, this information was obscured for reporting using image editing tools. This was less of a concern for Phase 2 data as PowerPoint files of lecture slides were collected. This meant that it was not necessary to use screenshots, so any identifying information could be deleted directly from the PowerPoint file. Lecturers were fully informed of these issues and their solutions before data capture.

Because students would not be captured by the video equipment, their written consent was not requested for the lecture observations. However, in the course of a lecture, capturing of students' speech might have been unavoidable, such as in response to a lecturer's question. Students were informed of the study by the lecturer during Phase 1, or by me prior to the commencement of the lecture during Phase 2. During Phase 2, arrangements were made with the lecturer to introduce myself and the study to students at the beginning of the lecture and to inform students that their speech might be captured. Students in both phases were asked if they had any objections to the recording and, if there were none, consent was assumed. Plans were made for solutions where consent was not granted, however, none of the student

audiences made any objections. Furthermore, since the audience was not captured visually by the video, it would be impossible to identify from the recording those students who spoke. Where names were used by any of the speakers, these were anonymised in the transcripts by substituting a pseudonym.

3.7.1.2 Interviews

Interviews were considered to be less troublesome in terms of ethical considerations, as their organisation and execution ensures that the aims are overt. Nevertheless, fully informed consent was gained before commencing any interviews with lecturers and students. Students were presented with an information sheet (Appendix 2) and consent form (Appendix 7) to sign before the interview. This included details of procedures, the collection, storage and reporting of data. As the information was discussed with lecturers via email prior to the commencement of the research, lecturers only needed to sign consent forms. Further, all participants were informed of the audio recording of the interviews and also that if they wished to talk 'off the record' they could request that the audio recorder be switched off. Interviews were not carried out until the forms had been signed.

3.7.1.3 Students' notes

The collection of students' lecture notes in Phase 2 also carried some extra considerations. For instance, students may write their names on their notes or otherwise include identifying information. In such cases, where the notes appeared in the report, the identifying information was removed from the electronic copies through image editing software. Notification of this procedure was included in the information sheets.

3.8 Summary

The research used a mixed methods approach in order to describe and explain slide-lecture practices relating to text and multimedia, so that possibilities for the creative re-mediation of slide-lectures using multimedia could be considered. There were two distinct stages of research carried out over two academic years, both collected data relating to lectures given in first year undergraduate psychology in UK universities. The first stage produced a corpus of 11 lecture transcripts on Attachment Theory. The second stage produced a corpus of 11 more lecture transcripts, along with both interview and documentary data linked to the lectures.

The methodological approach was considered carefully to ensure that the data collected and the analytical process would produce reliable and valid findings. In addition, research ethics were informed by established ethical frameworks, to ensure that the research would not cause undue harm, distress or anxiety to participants.

The following 3 chapters (Chapter 4, Chapter 5 and Chapter 6) outline the different stages in the empirical work, and are followed by a chapter (Chapter 7) discussing the outcomes in light of the contexts and backgrounds set out in Chapter 1 and Chapter 2. Finally, Chapter 8 contains the conclusions that may be drawn from this work.

Chapter 4 A description of speech-slide integration practices

4.1 Introduction

Chapter 2 outlined the culture of the slide-lecture, and described it as a particular genre of communication. In the slide-lecture there are two 'streams' of information being displayed simultaneously; the slides and the lecturer's speech. Owing to the common practice of providing the slides via VLEs, students might already have read these slides, or have them in front of them in the lecture theatre. Students then might come to believe that these slides contain key information that they will learn more about during the lecture. Importantly, this belief might lead to the assumption that the slides will be in some way acknowledged by the lecturer in their speech, whether directly or in some less explicit manner. In this way, it is assumed that the lecturer will integrate their slides with their lecture speech and vice versa.

It is the integration of the slides by speech that forms the focus of this chapter. Integration can be achieved through the use of a laser pointer or other physical means of identifying the object of interest, or 'slide-element'. However as identified in Chapter 2 (section 2.5.1), the usage of these is not by any means consistent and reliable, and may depend upon the lecturer's physical position in relation to the slide display. Therefore this chapter considers how this integration is performed through the lecturer's speech only. The chapter reports on a study that utilises data collected during Phase 1 of the research which is aimed at identifying the indicators of a relationship between slides and spoken expositions as present in observations of actual lecture practices. Before doing so however, the literature relating to speech/slide integration is examined in order to consider both its importance and the extent to which it has already been described.

4.2 Characterising the integration of slides and speech

In examining how lecturers integrate their slide material, it is necessary to distinguish the various ways in which lecturers identify an element on the slide to which they are referring. Owing to the scarcity of literature regarding the integration of slides with speech, it was difficult to find an existing framework for identification of the relationship. That is, frameworks that help in the identification of where and how the lecturer's oration directs the students' attention towards the slide or slide-element. Schnettler's (2006) characterisation of presenters as either 'orators' or 'performers' comes closest to describing the integration of slides with speech (see section 2.2.2). Moreover, in characterising conference paper presentations using slides, Rowley-Jolivet (2002) also provides some account of the integration of slides with speech. She does this through describing the audience's task in relation to the slide presentation. She points out:

> 'the co-existence of the two channels of communication creates a single textual space which has to be processed as an integrated whole by the audience: in other words, unlike the reader of a scientific article, who can process the information selectively, in a non-linear fashion, dissociating if s/he so wishes the visual from the text, the researcher attending a conference paper is obliged to follow the linear progression and semiotic mix imposed by the speaker, who is likewise constrained to ensure that his/ her verbal commentary is synchronised with the visual channel' (Rowley-Jolivet, 2002, p. 21)

Here, Rowley-Jolivet suggests that the speaker must follow, or 'synchronise' with the slides, and so she appears to be describing a situation in which the presentation is guided by the slides. Further to this, she also suggests that the audience of the presentation must negotiate both what appears on the slide and the speaker's 'synchronisation' of it. This suggests that the audience understands that the speaker will not literally be simply repeating the slide with her speech; rather they are looking to the speaker to identify for them the correct object to be attended to. Applied to a slide-lecture, it can be said that the lecturer is expected to reference the slides with their speech in some way.

In Schnettler's and Rowley-Jolivet's characterisations, repetition of the text by speech would constitute a means of pointing to the text to be read by the student. However, both Schnettler and Rowley-Jolivet also suggest that speech can point to the slide through more subtle integration procedures. Of course one would not expect that lecturers would explicitly tell students where information could be found within the text, by saying 'on the second sentence, three words in'. Admittedly a lecturer might tell students which point they are talking about, such as by saying 'next point'. However it would not be expected of lecturers to continue this practice throughout the lecture; rather, it was expected that lecturers observed in the present study would use a range of integration practices throughout the lecture. Consulting the limited literature on speech-slide interaction, it seemed that Knoblauch's (2008) 'secondary pointing procedures' could most accurately identify such subtle instances of integration of the slide by the speech.

4.2.1 Secondary pointing procedures

Secondary pointing procedures are, according to Knoblauch, a subspecies of linguistic deixis, in which the speech in some way parallels the slide. These

procedures were not outlined in detail in Knoblauch's 2008 paper as the focus was towards the physicality of pointing rather than of speech *per se*. Yet what is clear is that Knoblauch does not consider these paralleling procedures to be as explicit as true pointing procedures (i.e. physical movements). Instead, he argues, speech points in a circular manner, in which 'what is being said becomes evident by being seen, and what is seen is determined by being said' (Knoblauch, 2008, p. 87). Here, he is suggesting that the act of showing the slides on the screen is a form of non-physical pointing to the slide. By showing the slides or the slide-elements at the specific time, the speaker is pointing to the slide in such a way that what is said can be understood as relating to what is being shown. In this way, the speech does not even need to match the information on the screen, or point our attention to it directly, as it might only be indirectly related to what is being shown at the time. Therefore, when looking for pointing in the lectures it is not as simple as just looking for instances of the speech directly addressing the slide-text, or even finding the matching words in the speech and slide-texts. Instead pointing is likely to be more ambiguous and intangible.

A further consideration in the integration of speech and slide-text is that as Gabriel (2008) suggests, the most common item to appear in PowerPoint slideshows is a bulletpoint *list*, implying more than one object. That the slide might be organised in such a way implies that when giving a slide-lecture, the objects on the screen will be talked about in a particular pattern (i.e. the one illustrated on the slide). Thus it seems important for students to know which object on the slide is relevant to the speech or alternatively that nothing on the slide is being integrated at the time, so that they can assimilate the two, or disregard them where applicable. However, it is clear that in PowerPoint presentations, speech and slide-text might not mirror each other perfectly. Applied to the slide-lecture, this situation undoubtedly has implications for

the learning context of speech-slide integration. These implications will be examined by this research, however the next section outlines what conclusions about the learning context of slide-lectures can be identified by existing theory.

4.2.2 The learning context of slide-lectures

Chapter 2 (section 2.2.1) outlined Mayer's (2005a) CTML, in which it is assumed that visual and verbal information are processed separately in different processing channels. However, a complication within this perspective is that text is a verbal stream, but whereas the speech is auditory and verbal, the text is visual and verbal. The distinction is important, as according to the CTML, learning depends on the assimilation of what is seen and what is heard. When the information on the slides is text then, both the visual and the auditory streams are verbal, meaning that the information from both needs to be processed within the same channel. Yet Mayer states that there is a limit to how much one can process in each channel at a time (Mayer, 2005b). Thus owing to the verbal nature of slide-text and lecturer speech, processing complex text and auditory narration together can cause split attention, and therefore cognitive overload, which is considered not conducive to learning (e.g. Chandler and Sweller, 1991).

Owing to this dual-stream, dual-channel conception of the learning situation, slide-lectures are potentially fraught situations in which the student must process two streams verbally. Thus it makes sense to firstly focus on the relationship between speech and slide-text, before addressing issues relating to other visual information. As the lecturer's speech can be considered to make reference to, but might not present an exact replication of the slide-text, it is important then to consider the *extent to which* lecturers mirror their slide-text. It is possible that students' capacity for processing both streams might be influenced by such mirroring (or not). Thus the following

analysis examines the extent to which a sample of psychology lecturers managed this integration of *text* with speech throughout their lectures, whilst other types of slide objects (i.e. multimedia) are dealt with separately in Chapter 6.

4.3 Study 1: Identification of integration of text with speech in slide-lectures

As outlined in Chapter 3 (section 3.4), Phase 1 of the research involved the collection of a corpus of 12 videos of undergraduate lectures on Attachment Theory given as part of first year psychology modules during the academic year 2009/10. The lecture data was considered to be ideal for considering integration, as the topic was static, which would therefore allow an examination of how different lecturers approached the task of integration when the topic remained the same. The methods selected are detailed in Chapter 3 (section 3.4), but the following sections outline the research question addressed, the data set that was used to address it and the analytical procedures used in answering it.

4.3.1 Research question to be answered

The chapter examines the different approaches to and patterns of integration that lecturers might employ in slide-lectures in order to characterise the teaching and learning contexts of slide-lectures. The overriding research question for this chapter is **to what extent does the lecturer's spoken exposition integrate with the text in slide-lectures?** In order to address this question, some further questions need to be examined. Thus the three specific sub-questions which are addressed by this chapter are;

a. To what extent do written text representations appear on lecture slideshows?
b. How is this written text integrated into the lecturer's speech?

c. Are there individual differences in the extent to which lecturers integrate their slide-text?

Through addressing these questions, it is intended for the analyses to identify what tensions relating to speech-text integration might be revealed that could present a challenge to student learning.

4.3.2 The data Set

In total, 12 lecture videos were collected during this phase from 12 different lecturers. The data that was produced consisted of AVI files of the 12 lectures. These videos ranged from 35 minutes to 100 minutes in length. Although it was not a requirement of the research request to participants, and indeed the wording of the instructions for capturing the lecture was such that it did not assume that the lecture would be accompanied by a PowerPoint slideshow, all lectures were given using an accompanying PowerPoint presentation as the main visual resource. Therefore, the videos consisted of a PowerPoint presentation, accompanied by the lecturer's speech.

All of the lectures were transcribed, with the exception of one of the videos which was excluded from the analysis owing to the exceptionally poor quality of the recording that prevented the slide-text from being read. During the transcribing process, the slide transitions were used to split the speech into sections, such that each slide was displayed side-by-side with the accompanying speech. As the actual PowerPoint files were not collected from the lectures, screenshots of the lecture videos were taken of each slide in their entirety (it was often necessary to wait until the end of each slide's appearance in the lecture to capture the whole slide owing to the use of animation schedules to display items sequentially). The slide-text was also transcribed for ease of analysis. One of the lecturers supplied their PowerPoint files,

so in this case, the individual slides were used instead of screen shots. These transcripts were also coded for the use of animation schemes, namely whether all of the text was displayed from the beginning of the slide, or whether points were revealed one by one. In this way 11 documents were produced consisting of tables with the lecturers' speech in one column, and the slide and slide transcript depicting slide and individual object transitions in another.

4.3.3 Analysing the data

The analysis sought to consider whether or not the elements were integrated at all, and whether this integration might happen in characteristic ways. It was recognised that it would be necessary to examine the speech relating to the individual elements within the slide, rather than the slide as a whole. Thus the analysis of the Attachment Theory lectures sought first to consider how many and what type of objects were displayed on the slides, and then examine how these elements were integrated by the speech. The first analytical step then was to identify the kinds of things that were included in the slides. This produced a quantitative description of the type and number of each item utilised by the lecturers in the sample (Section 4.4).

Next, it was necessary to identify the specific means of integrating the slide-text with the speech. This was carried out through using a DA framework which compared the semantic content of the speech with the semantic content of the text to identify instances of matching, or 'integration' (Section 4.5). Then in order to examine individual differences in integration between lecturers, the pattern of integration present in each lecture was explored (Section 4.5.2). The DA approach was then revisited in order to examine the extent to which lecturers integrate their slides for specific purposes (section 4.5.3.1). The chapter then considers whether the

lecturers' integration might impact on the student's experience of the slide-lecture through comparing the experience of analysis between two coders (section 4.6).

4.4 An overview of the slide-lecture

Firstly, the lectures were examined based on some key descriptive criteria. The length of the lecture was recorded, using the timings of the recordings taken from the first word spoken by the lecturer to the last. The number of slides in the lecture was counted using the transcript tables. Instances in which the lecturer had any interactions with the audience were counted also using the transcripts. An instance of interaction was classified as a single questioning and response sequence, in which the lecturer poses a question, or set of questions, followed by a response (or responses) from members of the audience. Any questions posed to the lecturer by students were counted in the same way. Interactions were categorised depending on whether they were linked to specific slide materials or were related to the topic of discussion. For instance where a lecturer asked students what a word meant or what was happening in a video, this was categorised as relating to specific slide material, whereas where a lecturer asked a question about what she had just said, this was not related to specific slide material (the process of matching questions to slide-text and other types of slide objects is described in more detail in section 4.5 and 6.3.1 respectively). Means were calculated for the total number of words spoken per slide, which were established using the lecture transcripts. The use of animation scheme was determined by observing whether slides were displayed in their entirety from the beginning of the slides' appearance in the lecture, or whether each item on the slide was introduced separately. The use of EVS was observed, and each instance of usage (defined as a question posed by the lecturer to which students are requested to answer using their

keypads) was counted. Table 1 describes the lectures that were collected based on these characteristics.

Table 1: Table describing the characteristics of the Phase 1 lectures

Lecturer	Length of Lecture (hr:min:sec)	No. of Slides	No. of interactions with the audience	Interactions explicitly involving the use of slide material	Mean no. of words spoken per slide	Use of animation scheme	Use of EVS
Dr. Wright[7]	00:55:10	42	0	0	169.7	No	0
Dr. Moss	00:35:03	24	0	0	185.5	Yes	0
Dr. Leaman	00:52:29	26	4	2 (50%)	213.2	No	0
Dr. Vickers	01:22:33	43	1	0 (0%)	228.5	Yes	0
Dr. Lake	00:51:57	21	0	0	312.3	No	0
Dr. Ealy	00:54:59	26	0	0	223.7	No	0
Dr. Jackson	00:39:39	24	0	0	223.4	Yes	0
Dr. Cooper	00:42:33	30	0	0	211.1	No	0
Dr. Kemp	01:04:59	67	5	5 (100%)	82.9	No	5
Dr. Underwood	01:40:54	65	51	17 (33.33%)	193.7	No	0
Dr. Horsley	01:13:44	36	29	23 (79.31%)	278.1	No	0

Although there were some differences in length, interactions, quantities of slides and speed of slide transitions, overall, the lectures were fairly similar in format, with a PowerPoint slideshow being used throughout the lecture. It was uncommon for lecturers to use other equipment, and indeed only one lecturer made use of an EVS. Additionally, only two lecturers made extensive use of interactions with students.

As no further data were collected from the lecturers, the lectures were not described further based on any other characteristics such as the number of students attending, or the lecture's position in the module. Such information might be useful in

[7] Lecturer data was anonymised through the use of pseudonyms

considering general lecturing practices, however, it was considered unnecessary for examining the speech-slide relationship (it remains the same regardless of the size of the audience).

The thesis considers whether the lecturer's relationship with their slides can be understood through consideration of their interactions with different objects included on the slides. The next task then, was to decide what these objects were through identifying what is displayed on the slides, for instance text, graphs, diagrams and so on. These objects are hereafter referred to as 'slide-elements'.

4.4.1 The slide-elements

The term 'slide-element' refers to any single unit of meaning that is included on the slide. Basically, this unit includes any distinct object that can be put onto a PowerPoint slide. For an object to be distinct, it needs to be spatially separated from anything else on the slide (with the exception of the slide background). For instance a single bulletpoint is distinct from other bulletpoints in a list, including sub-points as each bulletpoint is separated by a space underneath or to one side. Where text is included without a bulletpoint marker (for example, ● or ►), spatial markers can be used to indicate distinctness, for instance for a number of sentences to be classed as distinct rather than within the same paragraph, there needed to be a clear spatial indicator for their separateness. To illustrate this, in Figure 1 below, the unit 'Waters et al (1990):' is separated from the following sentence 'newborn neurological status…' by a large gap. Had the 'newborn…' sentence been placed directly after the ':' at the end of the 'Waters et al…' sentence, then the two would be considered as a single unit, or paragraph, yet the spacing indicates a separation of the two units.

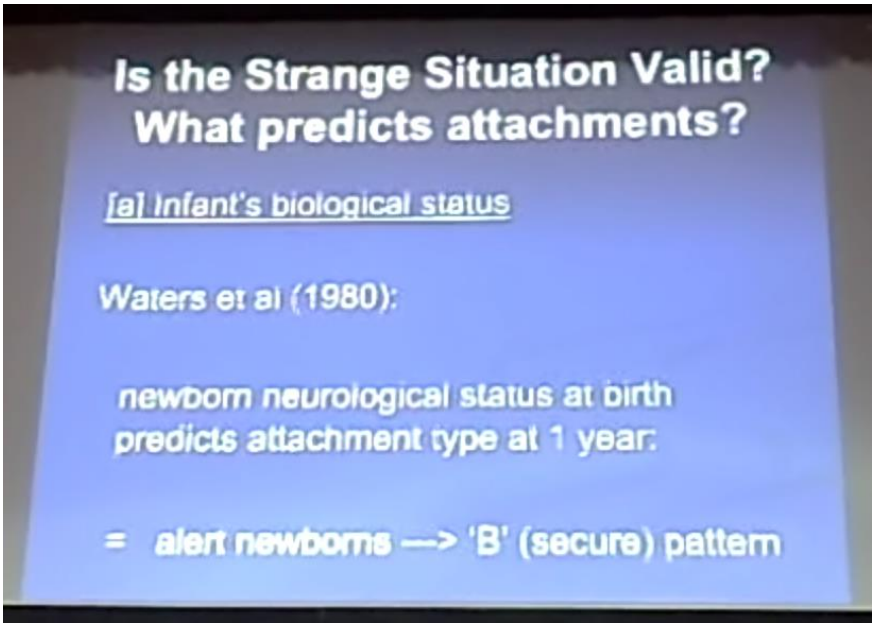


Figure 1: Example of distinct text objects without the use of bulletpoint markers

Differences in appearance were also used to identify distinctness, for example changes in font size and colour, such as the title at the top of the slide in Figure 1. However such changes were not thought to indicate separateness when they appeared in the middle of a sentence or bulletpoint, for instance in using italics or underlining to emphasise a word.

Multiple sentences of text, or objects contained within a boundary, for instance figures within a table, were classed as being of an overarching distinct object, in this example a table. Additionally a single photograph or diagram or other visual element placed to one side of the slide is distinct from the surrounding text on the other side of the slide (however occasionally there is overlap between these, for instance a caption for a photograph, which is discussed separately below).

Owing to the focus on the way in which different types of representation are dealt with by the speech, it was necessary to categorise these elements according to

their modality. As the analysis would first focus on the integration of text elements, it would be necessary to identify those elements which are text based and those which offer a different modality. Identification of text was relatively straightforward, that which needed to be 'read' in a linear fashion was categorised as text. As other types of representation contain some form of visual aspect to their meaning, for instance photographic inscriptions or graphical displays, and also text within a table or text within an image, anything else was categorised as a 'visual' element, or VE.

On initial inspection of the transcripts then, there were a number of different elements used to make up the slide, including, but not limited to text bulletpoints, headings, photographs, diagrams, videos, data tables, and graphs. Clearly then, the labels 'text elements' and 'visual elements' do not do justice to the richness of different things that can be displayed on slides. Rather, it seems clear that there are different subcategories within these two types which needed to be identified and categorised using a suitable taxonomy of elements.

4.4.2 Establishing a taxonomy of slide-elements

There are surprisingly few extensive typologies of the representations that are used in slide presentations. Gabriel (2008) writing of his own experiences of using PowerPoint in educational settings suggests that slide-elements can fall into three categories; lists, images and statistics. However, on applying these categories to the lecture data, the richness was overlooked. For instance it is unclear what would be counted as statistics; perhaps a graph or table, but what about a diagram?

Taking into account the semiotic systems employed in viewing slide-elements, Rowley-Jolivet (2002) identified a typology of items used in conference presentations which could be broken down into four categories. These categories differ in both the

semiotic system they belong to i.e. which modality they are transmitted by, and further, by their polysemic capacities: i.e., the extent to which a category can convey multiple meanings or only a single meaning (monosemic). According to these capacities, a representation can be either monosemic, i.e. convey a single meaning, or polysemic, conveying any number of meanings depending on where and how it is used. De Vries and Masclet (2012) argue that the use of polysemic representations is frequent in situations in which one needs to acquire a creative response to the representation, whereas monosemic representations are more frequently used when one needs to constrain the meanings that are read. This is because monosemic representations 'aim to reduce misunderstandings' (de Vries and Masclet, 2012, p. 5).

Based on Bertin's (1973) distinction of types of representation (cited in Rowley-Jolivet, 2002), Rowley-Jolivet lists the different types of representation in scientific conference presentations according to their polysemic capacity. Here, text and graphical images are considered monosemic, for instance bulletpoints, graphs, diagrams and so on, whereas photographs are considered polysemic. Such categories along with their polysemic capacities and their semiotic system, as outlined by Rowley-Jolivet are outlined in Table 2 (p. 120). On application to the lecture data, Rowley-Jolivet's typology reflected some of the semiotic richness of the different elements contained within the lectures, so the slide-elements were broken down into these broad categories. However, these distinctions were not always easy to make, and some special cases needed further consideration, which necessitated the establishment of a new taxonomy specifically related to elements displayed within a slide-lecture. These cases are outlined below.

4.4.2.1 Different types of text

When examining text objects, it was noted that there were different types of text objects used by lecturers. For instance Figure 2 below shows what can be described as a title, followed by a quote, and then two bulletpoints. Identification of these different types of text object was often not too difficult, as there is almost always a distinction apparent in the format, for instance a title is usually in larger font than the rest of the slide and placed at the top of the screen. However occasionally, a title might be the only element placed in the middle of the slide. It was decided that 'title' was not the best descriptor of such elements, and so the category 'structural text' was given to any text which tells of the content of what is to come either in the same slide, or in the following slides.

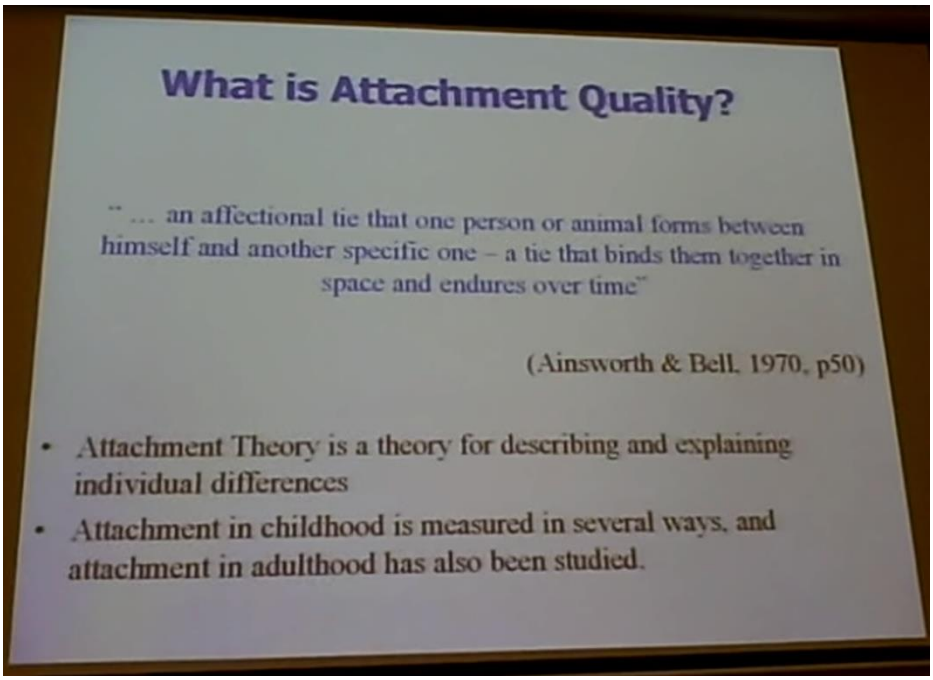


Figure 2: Example of different types of text object within the same slide

Quotes also presented a difficulty. Although they were easy to identify, as they were always surrounded by quotation marks, they were usually accompanied by a

reference underneath and to the right of the quote, so it was necessary to decide whether the reference was distinct. Although spatially distinct, it was decided that the reference was an integral part of the quote, and not intended to be understood as a separate piece of information. Thus the category 'quote' refers to the quote plus its reference in brackets underneath.

Finally, it was questioned whether lists of bulletpoints and sub-points related to overarching points should be considered distinct elements. As each item of a list or sub-point can convey a new piece of information, it was considered that such lists and sub-points should be considered as distinct elements. These were all considered to be contained within the category of 'bulletpoints'.

4.4.2.2 Are captions problematic?

An important consideration relating to VEs was the tendency for them to be accompanied by a caption or title. Could these labels be considered as separate text entities or were they part of the VE? Below are some examples of captioning in the data.

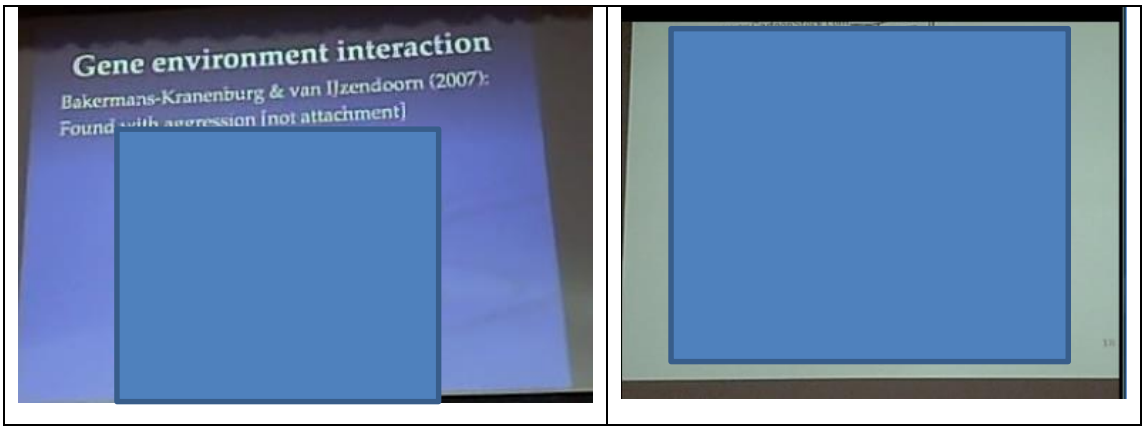


Figure 3: Examples of text captioning of visual elements

In the first image, the text is clearly attached to the bottom of the graph, as the background which contains both is different to the background of the slide. As such anything within this distinct background should be understood as an integral part of the representation. In the example on the right though, the text is spatially separated from the image, however the text and image are similar in style i.e. apparently hand produced. It was considered that in such cases, this similarity of style should be thought of as indicating that the units of meaning are attached rather than having been placed on the slide separately by the lecturer. Thus in cases where the text was clearly attached the visual object itself, or attached by similarity of style, the text was considered to be a part of the VE.

4.4.2.3 Videos

Videos are not covered by either Gabriel's or Rowley-Jolivet's categories. They present a complication because videos can be both visual and textual, for instance a video of a recorded lecture that used a text based slideshow would have both visual and textual elements. Further complicating their classification is that they are dynamic and so can move between visual and textual modalities, and are also accompanied by their own auditory material, adding another modality. The relationship between the video and the lecturer then might be affected by the auditory stream. It was decided that owing to the complex interplay of the characteristic of videos, they were to be considered as distinct types of polysemic elements.

4.4.2.4 Dynamic Diagrams

Diagrams were classified as displays connecting text and visual information in a particular spatial arrangement. However, one lecturer utilised the slides to display a sequence of changes made to a diagram to accompany the speech. Figure 4 shows screenshots of some of the sequences of changes made to the diagram. As the diagram

remained mostly unchanged whilst only two features were moved or changed, it was considered that these screenshots do not represent distinct diagrams. Rather it was considered that the changes made were an integral part of the diagram, and as such the entire sequence of changes was treated as an animated, or ‘dynamic diagram’. There were no further examples of this category in the sample.

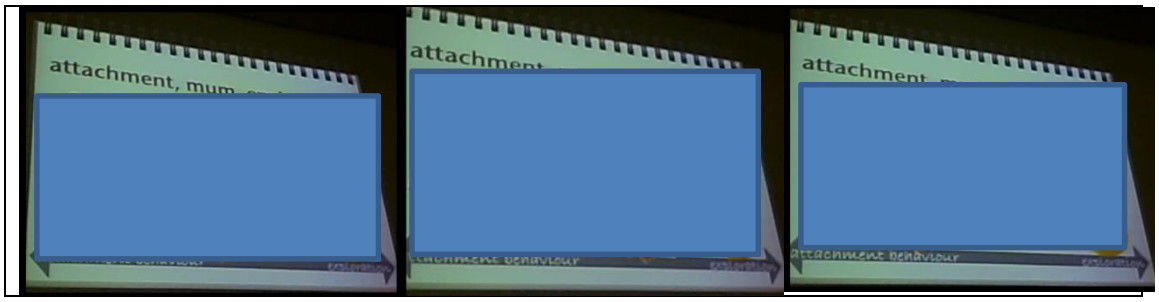


Figure 4: Example of a ‘dynamic diagram’

4.4.2.5 Photographs vs. images

It was noted that there was an implicit difference in the visual ‘pictures’ that were used on slides. Some were realistic photographs; however some were more abstract drawings or images. One question was the extent to which there is a difference between ‘photographs’ and ‘images’. Rowley-Jolivet’s distinction between ‘figurative I’ and ‘figurative II’ representations consider ‘simple’ photographs distinct from photographs or drawings which have been manipulated in some way. Thus it was considered here that photographic representations were those that are captured by camera, and have not been subjected to obvious manipulation, and images were depictions that had been drawn in some way, either by hand or using image editing technology. However, it has to be noted that photographs can be edited, and thus can also be considered as being manipulated. For instance the below slide contains a photograph which has clearly been edited to remove background data.

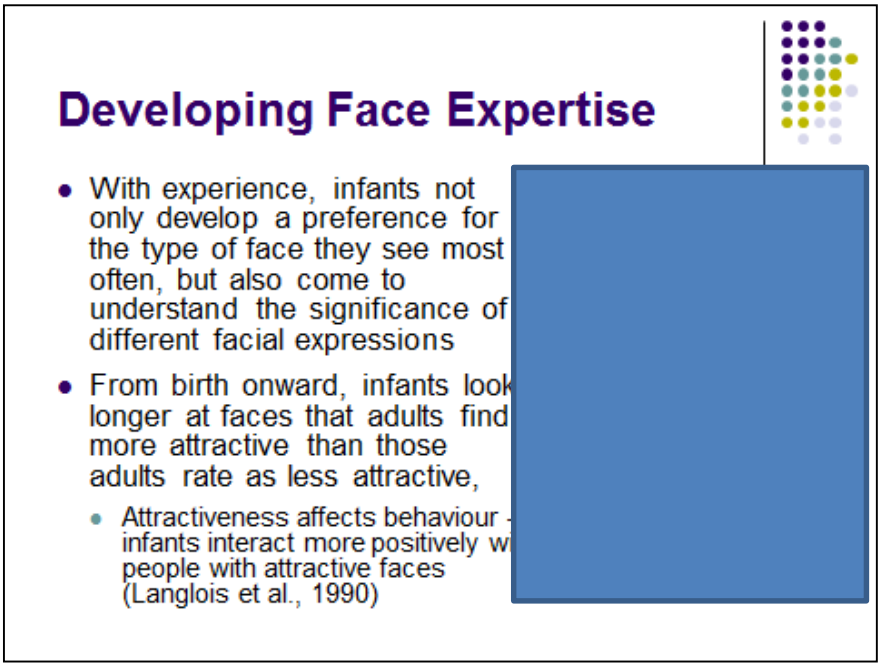


Figure 5: Example of an edited photograph

This example depicts an obvious manipulation, but it is also possible that a photograph can be manipulated imperceptibly. Clearly such photographs would be difficult, if not impossible to identify. It was assumed that as such photographs are intended to look like a 'simple' photograph, they could be classified as such.

It is acknowledged that 'images' as defined here can also be photographed and displayed on a slide. This is an important observation, and it is possible that there might be an overarching category for the two types, with specific representations residing somewhere between the two types. However, Rowley-Jolivet's distinction between that which is captured by camera and that which is manufactured to deliberately enhance or distort a particular feature indicates that there is an implicit difference between the two. Clearly then, the two types could be considered as distinct, albeit very similar categories. The above would be categorised as an image, it has been obviously enhanced in order to change particular features. However, there

appeared to be relatively few examples of such obvious manipulation. Further, in terms of photographic copies of manufactured images, it was decided that where the photograph contained *only* the image, it would be categorised as an image. Where any extraneous information was included (e.g. a frame, a background and so on) this would be categorised as a photograph. This owes to the differences in semiotic potential between a photograph of solely an image, and a photograph of an image in a particular space or context (this point is addressed further in Chapter 6).

4.4.2.6 PowerPoint objects

An additional point to note is where the lecturer might use a pattern scheme for their PowerPoint slides, as evidenced in Figure 5 above. Additionally, lecturers might have used a header and/ or footer for their slides detailing their email address, or information about the lecture, such as the module title, slide number or date of the lecture as highlighted in Figure 6.

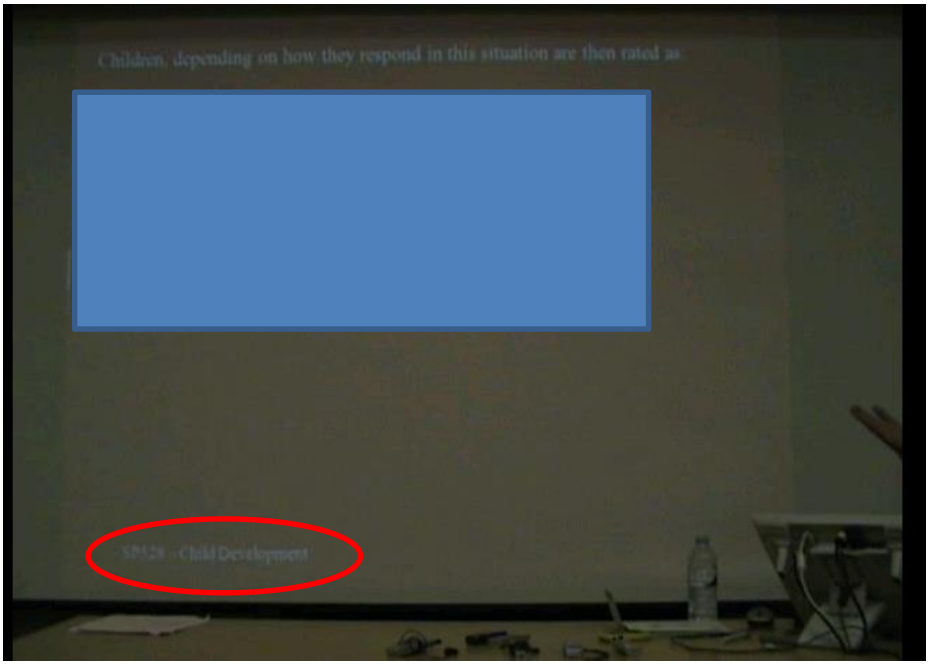


Figure 6: Example of the use of slide 'footers'

Although these present an interesting question regarding what should be counted as a unit of meaning in a PowerPoint slide, it can be assumed that the lecturer does not mean for it to be a unit of meaning. In contrast to slide titles, which provide substantive information relevant to the particular slide, these objects remain present in the same format in every slide in the lecture. This suggests that they are not intended to be understood as content information, and instead they are understood as a means to distinguish the slides from slide sets used in other lectures. It is assumed that such 'labelling' of the slides through headers, footers or design templates functions to help students organise or navigate their notes following the lecture, rather than to provide content information. As a result of this assumption, these were not included in the taxonomy of slide objects, as the taxonomy refers to 'content' objects rather than to 'navigational' objects. However, slide titles, which were identified by their containing content information, and their being different for each slide or for a series of slides within the presentation, were categorised within the taxonomy of slide-elements.

4.4.2.7 Text and numerical tables

Tables were defined as information arranged within cellular gridlines. It was noted that tables could contain text, numbers or a mixture of both. Rowley-Jolivet's taxonomy defines tables as numerical, however it cannot be reasoned that text tables are also numerical, unless they also contain some numerical information. Additionally they cannot be read in the same way as other text elements, as the layout of the table introduces a visual aspect to the reading of the text. Thus tables needed to be separated into those which are numerical and those which are textual, and those which were mixed, yet they were all considered as visual elements.

4.4.2.8 Web links

Finally, it was noted that web links would be displayed as a slide-element. These are a particular visual resource as the web link itself is not intended to be read or to be interpreted in any way. Rather it is included as a means for lecturers to visit particular resources, or to provide a means for students to visit it later. Nevertheless, they were considered to be elements representing content, so were included in the taxonomy. Therefore a separate resource category was created for these elements.

4.4.3 An extensive taxonomy of slide-elements

The cases outlined in the preceding sections indicate that existing taxonomies, such as the one proposed by Rowley-Jolivet, might not be entirely representative of the types of elements included in lecture presentations. Therefore a new taxonomy of slide-elements used within slide-lecture presentations was created, using Rowley-Jolivet's taxonomy as a starting point. This taxonomy takes into account subtle differences between different slide-elements, more so than do the previous taxonomies, and so provides a more suitable categorisation scheme for the fine grained analyses required for this research. The taxonomy is represented in Table 2 and examples provided in Table 3 below.

Table 2: Taxonomy of the slide-elements used in the Phase 1 sample based on Rowley-Jolivet's (2002) classification of slide objects

Type of visual	Rowley-Jolivet's Sub Type	New Sub-type	Semiotic System	Monosemic or Polysemic?	Visual or Text?	Frequency in Sample	% of total elements
Scriptural	None	Bulletpoints	Linguistic	Monosemic	Text	1522	72.58
	None	Structural	Linguistic	Monosemic	Text	386	17.55
	None	Quote	Linguistic	Monosemic	Text	15	0.72
Graphical	None	Graph	Visual	Monosemic	Visual	18	0.86
	None	Diagram	Visual	Monosemic	Visual	19	0.91
Figurative	Figurative I	Photographs	Visual	Polysemic	Visual	68	3.24
	Figurative II	Images	Visual	Polysemic	Visual	14	0.67
Numerical	None	Pure numerical	Mathematical	Monosemic	Text	4	0.19
	None	Textual numerical	Linguistic	Monosemic	Text	7	0.33
	None	Mixed	Mathematical & Linguistic	Monosemic	Text	4	0.19
Dynamic	None	Video	Visual	Polysemic	Visual	24	1.14
	None	Dynamic Diagram	Visual	Monosemic	Visual	1	0.05
Resource	None	Web resource	-	-	-	18	0.86

Table 3: Taxonomy of slide-elements with definitions and examples from the lectures

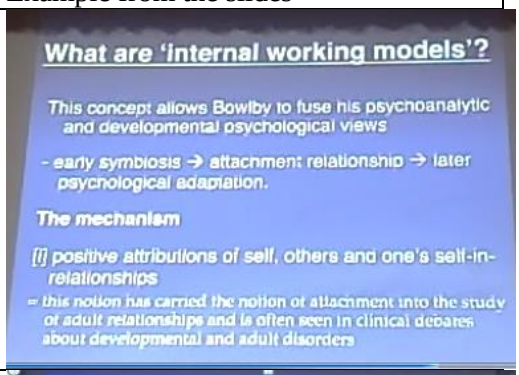
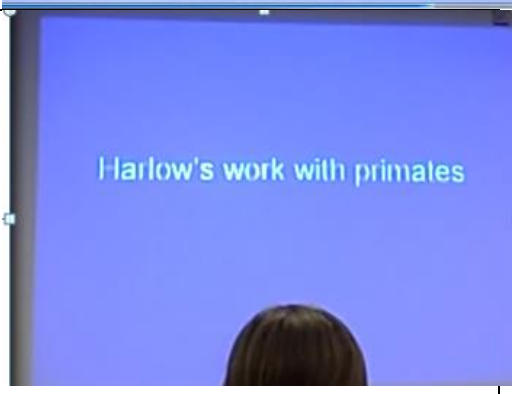
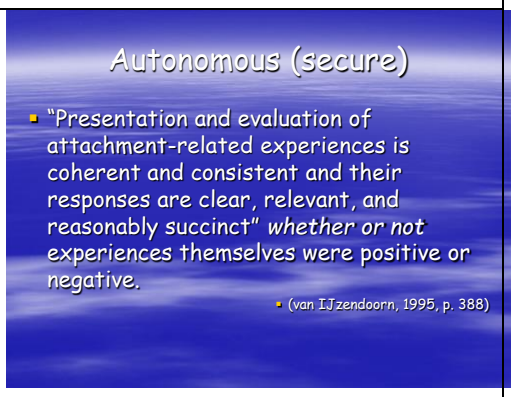
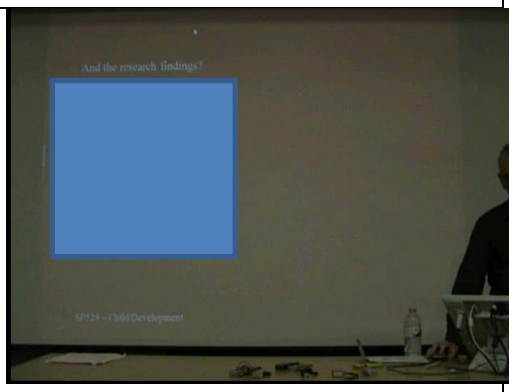
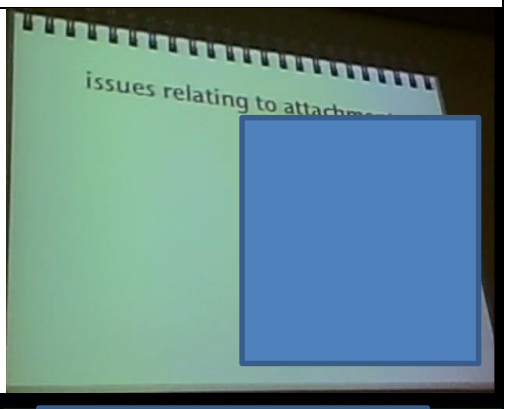
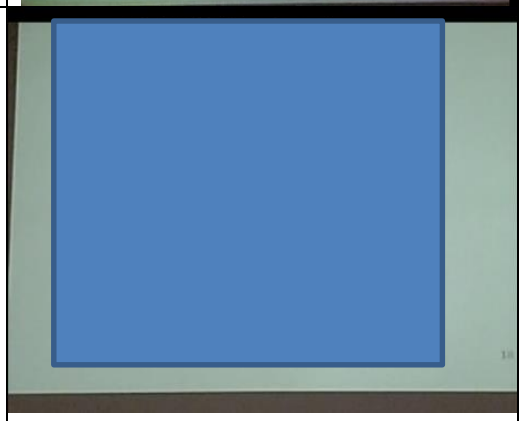
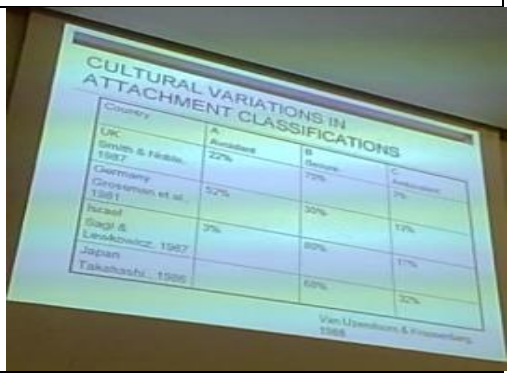
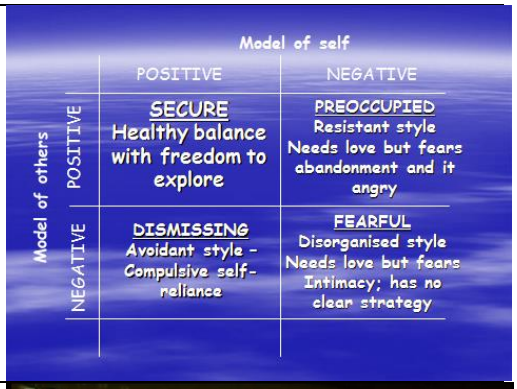
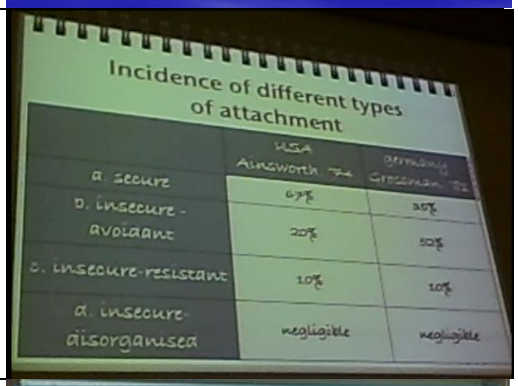
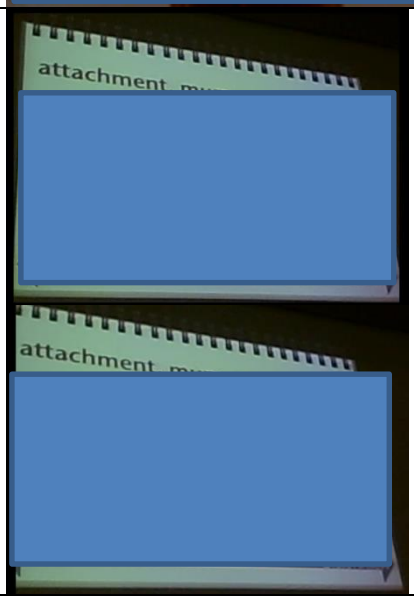
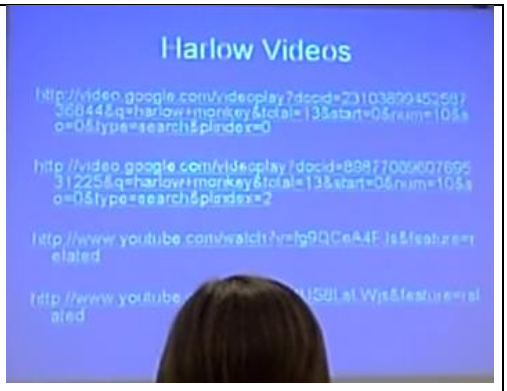
New Sub-type	Definition	Examples	Example from the slides
Bulletpoints	Individual text items such as sentences, paragraphs and individual words, including individual items in a list, which are separated by the use of bulleting or numbering and spacing.	bulletpoint lists, summaries,	
Structural	Text which sets out the topic of the coming slides, or of the single slide itself	Titles	
Quote	Text taken from a secondary source which is within quotation marks and referenced in brackets	Quotes	
Graph	Graphical displays of statistical information	Graphs,	

Diagram	Displays incorporating both visual and text based information spatially arranged to depict a relationship or process, including simple flow diagrams as well as more complex figures	Diagrams	
Photographs	Anything captured by camera depicting a person, scene or event including photographs of existing representations	Ordinary photographs	
Images	Visual depictions of a person, scene or event that has been drawn or otherwise manufactured to represent the item or idea.	Enhanced or manipulated photographs and images	
Pure numerical	Text based mathematical rules. Columns and rows of numbers displayed within gridlines	Mathematical formulae, numerical tables	

Textual numerical	Columns and rows of text displayed within gridlines	Text tables	
Mixed	Columns and rows of numbers and text displayed within gridlines	Tables containing textual and numerical data	
Video	Dynamic animations, with or without audio narration, which are either embedded into the slide or shown outside of the PowerPoint slideshow		
Dynamic Diagram	Displays incorporating both image and text based information spatially and temporally arranged to depict a relationship or process, including simple flow diagrams as well as more graphically complex figures		

Web resource	A URL pasted onto the slide	URLs to web links	

4.4.4 A quantitative description of the sample

It is clear that a PowerPoint slide is highly flexible in terms of what can be included. This description of the sample based on what slide-elements were employed is important in order to consider the research questions to be addressed by the analyses. The lecture transcripts were examined using this taxonomy of slide-elements to provide a quantitative measure of the proportions of different types employed (included in Table 2). Table 4 below shows the different types of elements employed by the different lectures in the sample. By far the most common form of text structure was the bulletpoint, and indeed Table 2 and Table 5 highlight the relative proportion of bulletpoints to other types of element used in the lectures. The lecturers' reliance on the use of bulletpoints provides weight to the initial focus on the integration of text representations as although there are many options, the most used is the linear textual display.

Table 4: Breakdown of use of each type of element by Phase 1 lecturers

Type of element	Subtype	Polysemic or monosemic?	Dr. Wright	Dr. Moss	Dr. Leaman	Dr. Vickers	Dr. Lake	Dr. Ealy	Dr. Jackson	Dr. Cooper	Dr. Kemp	Dr. Underwood	Dr. Horsley	Total
Scriptural	Bulletpoints	Monosemic	163	91	141	247	80	73	34	182	221	125	165	1522
Scriptural	Structural Text	Monosemic	44	24	33	43	3	27	17	32	68	63	32	386
Scriptural	Quote	Monosemic	2	0	1	2	0	0	1	1	0	8	0	15
Graphical	Graphs	Monosemic	2	6	0	0	0	0	3	1	5	0	1	18
Graphical	Diagrams	Monosemic	3	1	3	0	1	2	0	0	0	6	0	16
Figurative	Photographs	Polysemic	0	10	15	5	2	6	2	3	2	28	3	76
Figurative	Images	Polysemic	0	0	2	0	1	1	0	0	0	1	1	6
Numerical	Pure numerical	Monosemic	0	0	1	1	0	0	2	0	0	0	0	4
Numerical	Textual numerical	Monosemic	0	0	1	1	0	0	5	0	0	1	0	8
Numerical	Mixed	Monosemic	0	2	0	1	0	0	1	0	0	0	0	4
Dynamic	Video	Polysemic	3	1	0	1	2	1	6	0	2	3	2	21
Dynamic	Dynamic Diagram	Monosemic	0	1	0	0	0	0	0	0	0	0	0	1
Resource	Web resource	Monosemic	0	0	0	0	0	2	1	0	0	15	0	18

Table 5: Table showing the presence of elements as a percentage of total element usage

Type of element	Subtype	Polysemic or monosemic?	Dr. Wright	Dr. Moss	Dr. Leaman	Dr. Vickers	Dr. Lake	Dr. Ealy	Dr. Jackson	Dr. Cooper	Dr. Kemp	Dr. Underwood	Dr. Horsley
Scriptural	Bulletpoints	Monosemic	75.1	66.9	71.6	82.1	89.9	65.2	47.2	83.1	74.2	50.0	80.9
Scriptural	Structural Text	Monosemic	20.3	17.6	16.8	14.3	3.4	24.1	23.6	14.6	22.8	25.2	15.7
Scriptural	Quote	Monosemic	0.9	0	0.5	0.7	0.0	0.0	1.4	0.5	0.0	3.2	0.0
Graphical	Graphs	Monosemic	0.9	4.4	0.0	0.0	0.0	0.0	4.2	0.5	1.7	0.0	0.5
Graphical	Diagrams	Monosemic	1.4	0.7	1.5	0.0	1.1	1.8	0.0	0.0	0.0	2.4	0.0
Figurative	Photographs	Polysemic	0.0	7.4	7.6	1.7	2.2	5.4	2.8	1.4	0.7	11.2	1.5
Figurative	Images	Polysemic	0.0	0.0	1.0	0.0	1.1	0.0	0.0	0.0	0.0	0.4	0.5
Numerical	Pure numerical	Monosemic	0.0	0.0	0.5	0.3	0.0	0.0	2.8	0.0	0.0	0.0	0.0
Numerical	Textual numerical	Monosemic	0.0	0.0	0.5	0.3	0.0	0.0	6.9	0.0	0.0	0.4	0.0
Numerical	Mixed	Monosemic	0.0	1.5	0.0	0.3	0.0	0.0	1.4	0.0	0.0	0.0	0.0
Dynamic	Video	Polysemic	1.4	0.7	0.0	0.3	2.2	0.9	8.3	0.0	0.7	1.2	1.0
Dynamic	Dynamic Diagram	Monosemic	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Resource	Web resource	Monosemic	0.0	0.0	0.0	0.0	0.0	1.8	1.4	0.0	0.0	6.0	0.0

4.5 Integration of slide-text with the lecturers' speech

It is clear that slide-lectures contain proportionately more text elements than any other type of representation. The second sub-question considers how lecturers integrate this text with their speech. To address this question it was necessary to isolate the speech relating to text elements. Once the slide-elements had been identified and quantified then, the analysis turned to identifying and quantifying the extent to which lecturers integrated the slide-text into their spoken exposition.

As mentioned in section 4.3 this analysis was not expected to be as simple as reading the text and looking for the matching speech in the transcript. Although cited as a common occurrence in much of the literature on PowerPoint presentations (Maxwell, 2007, Klemm, 2007, Adams, 2006, Tufte, 2004, Kirschner, Sweller and Clark, 2006), it was clear from an initial reading of the transcripts and slides that the practice of literally 'reading out the slide' was not as prevalent as claimed. Rather it often took the form of Rowley Jolivet's (2002) description of 'synchronisation', or Knoblauch's (2008) subtle 'paralleling'. The identification of text elements by the speech then would be achieved by semantically matching the speech sections which accompany the individual text elements. It was assumed that these matches would be communicated by some kind of pointing to or referencing of the element by the speech, whether directly or indirectly.

4.5.1 Secondary Pointing Procedures in use

Knoblauch's (2008) framework for secondary pointing procedures suggests speech can mirror the slide through the linguistic procedures of anaphora, cataphora and reflexive pronouns; paralleling or reformulating whole sentences; making allusions to contrasts; oppositions and itemizations; and the use of topicalization

'almost like a catchline' (Knoblauch, 2008, p. 87). Either way, the speech points to the information which is being spoken about at the time. Using this existing framework afforded an idea of what to look out for when analysing the transcripts. However, the initial attempt at identification proved rather problematic as Knoblauch's procedures were not thoroughly defined enough to cover the range of possibilities that lecturers might use in their speech. This is due to the lack of definition of the linguistic terms *in relation to their use in a speech-slide interaction*. The exception of this was 'recognition markers' which are also acknowledged, although labelled differently, by Schnettler (2006). Similar to Knoblauch's recognition markers, Schnettler (2006) utilises the employment of 'keywords' in the speech that are also present in the slide as signals of pointing in his analysis of the mediation of PowerPoint presentations. In Knoblauch's example of such an occurrence, the words spoken include the same words that are displayed on the screen (Knoblauch, 2008). Thus one of the fundamental and explicit ways in which the lecturer might indicate that there is a match in the content between the speech and the slide is through speaking the same words that appear on the screen.

However, the other procedures were not as adequately described. Thus before considering the extent of integration, it was necessary to categorise the ways in which integration occurred during the lectures. The categorisation involved a DA approach focussing on the semantic similarity between the speech sections of the transcript and the content of the text element, in order to not only match the speech sections with its corresponding slide-text, but consider the way in which this matching was achieved. To perform such an analysis, each text element was regarded as an item which contains meaning(s) which *could* be unpacked by the lecturer. Whether or not the speech could be considered to be integrating the text was based on the extent to which

the meanings present on the slides were introduced into the lecture by the speech and how. Thus in identifying the extent to which text was integrated, it was necessary to first identify the meaning present in the text which could be integrated.

4.5.1.1 Identifying meaning in slide-text

As text is a monosemic representation of a concept, it might be considered fairly simple to identify meaning in text; it can be read. However, as different words can represent the same concept, text is also potentially ambiguous. Text is considered to be an abstract means of representing the signified object in which meaning is fixed as the arrangement of letters represents ideas rather than real things (McCloud, 1994). For instance, the word 'baby' looks nothing like a real baby, but it invokes the idea of a baby. Yet it is also true that the same concept can be represented by different words, or combinations of words, for instance the words 'infant', 'new-born' and so on, could be used to replace the word 'baby'. Thus in substituting words, the speech and text are essentially conveying the same semantic meaning even if they do not match perfectly. As an illustration of this substitution, whilst displaying the words 'Innate module for social understanding', one lecturer said the words 'innate propensities for social understanding'. Here the word 'propensities' replaces 'module', yet in psychology, these words can express the same idea; a predisposition[8]. It is possible that the lecturer here was deliberately introducing two different terms (and their surrounding disciplinary nuances) in order to provoke students' questioning of the use of the terms. Even if the student doesn't pick up on this replacement though, the rest

[8] Although the choice for use of the two terms might result from different disciplinary standpoints, for example 'module' implies something that exists as a physical, hard wired area of the brain which deals with the social understanding and thus is a strongly nativist term. 'Propensity' on the other hand might be employed to imply a *tendency* towards social understanding and thus suggesting an empiricist standpoint.

of the sentence remains the same, so the student can still match up the words to come to the same (or similar) understanding.

It should be noted then, that the categorisation of the integration of text with speech was often problematic. For instance although a recognition marker could be understood as the speech repeating the exact same words that appear on the screen, it was noted that often the lecturer changed the wording slightly by substituting words or changing sentence structure. It was reasoned that this should still be classified as a means of integrating the slide-text. Yet it is not clear from Knoblauch's paper how close the match needs to be for the speech to be classified as a recognition marker of the text. Knoblauch suggests that presenters might also 'slightly reformulate' the text on the slide. Here the lecturer might use the same wording but change the structure of the sentences, or substitute words with the same meaning. However, it was still not clear how far the text can be reformulated and still be considered to be a reference to the text. Often lecturers went further than simple substitutions or sentence reformulations, rather the text on the slide had been mangled by the speech, such that the two streams were semantically similar yet used a different sentence structure *and* different terms. Thus it was not always easy to recognise the slide reflected in the speech, yet the reflection existed in the semantic meaning. In these cases the lecturer was considered to be 'mangling' the text. For example whilst displaying the words 'Infant anticipations about caregivers' reactions to bids for comfort' on screen, one lecturer said

> 'Another feature that's assumed to be in the representational model is some kind of evaluation that the infant does of how, how worthy they are, self-esteem. So as a theory this

> is something which feeds into people's ideas about whether they're actually, you know, worthwhile, because if you get your response and you get your needs met and if you get comfort when you need comfort, then that feeds into you feeling that you're worthwhile person.' (Dr. Cooper)

Although the speech here is very far removed from the short sentence appearing on screen, speech and slide are both suggesting the same message; that the infant will assess what their caregiver will do if they attempt to get comfort. This may be a useful technique on the part of the lecturer, as potentially it invites students into some form of cognitive decoding of both the speech and the slide-text. Potentially then, such a practice could result in greater depth of processing. Such a possibility is worth keeping in mind, and as such will be discussed throughout the next sections and the following chapter; however it is first necessary to identify *how* text is integrated, before considering the *functions* of it. Thus in such cases in which there was difficulty in identifying that the lecturer was integrating the slide with their speech at all, it was necessary to consider the semantic content of the messages and whether the same understanding could be made of the two streams. To ensure confidence in such instances, a reliability check was carried out on the coding using a second coder. This procedure and its outcomes are detailed in section 4.5.1.2 below.

Additionally, it was noted that demonstratives (i.e. 'this idea'…) were also a problematic means of identification of pointing as although they can be used to point to something concrete in space (i.e. a bulletpoint) they can also refer to a concept or idea. Thus demonstratives can be used to identify something which has already been spoken about or even something that exists independently of the lecture context,

meaning that there does not need to be a corresponding slide-element. When a lecturer says ‘this’ or ‘these’, it doesn’t necessarily follow that they are referring to a slide-element(s). The identification of demonstratives then relied on reading the rest of the sentence in order to establish whether it could be considered as a reference to an element on the slide or an empty reference.

Of course the lecturer will not always be interacting with the slideshow throughout the whole lecture; there will be housekeeping interactions such as checking that the audience can hear the lecturer, talking about an assignment and course announcements and so on. In these cases it was presumed that the student would almost certainly not identify these instances as integration. However there were also instances in which the lecturer was speaking about substantive lecture information which was not represented on the slide in any format, for instance they might have developed points further, or added additional points which were omitted from the slide. It was accepted that such instances could not be classified within the schematic as they are not means of integrating the slide-text; rather they are means of expanding on the slide-text. For instance whilst displaying the words ‘Proximity/ frequency to mother and stranger’, one lecturer mangled the text in order to integrate it, then added to it an explanation:

> Integration: ‘We’d look at how close does the baby get to her mum when they’re in the room together, does the baby play with the toys by her mum or does she just ignore her mum or wander around the room?

Explanation: Secure attachment means that the baby has this strong bond with her mum but yet she feels confident to go off and do her own thing.' (Dr. Horsley)

Although in giving the explanation the lecturer was relating to the slide-text, she was no longer integrating it.

This categorisation of integration of text with speech is summarised with examples in Table 6 below. One important thing to note is that lecturers could use a combination of the procedures in integrating the text, for instance they might use a directive/ demonstrative to point to the slide then use a recognition marker to point to a specific part of the text. Thus a quantitative measure of the extent of usage of these procedures would not produce any meaningful findings in relation to the extent to which slide-text was integrated. For this reason, the instances of integration were not coded in terms of the procedure being used to integrate the slide-text; rather the speech was coded in terms of simply whether or not it was integrating slide-text at the time.

Table 6: Table describing the integration of text with speech based on Knoblauch's (2008) Secondary Pointing Procedures

Secondary Pointing Procedure	Definition	Example	
		Speech	Slide-text
Recognition markers & paralleling whole sentences	Spoken words that are also present in the slide-text (Knoblauch, 2008, p. 87). This might be considered to be reading entire sentences from the slide, or simply speaking the significant words present in the text	**Questions** like this. **In what ways do early parent-child relationships and interactions differ**	Key questions – this week In what way to early parent-child relationships/ interactions differ?
Itemizations	Providing there are more than one slide-elements present, the speech addresses the structure of the slide and the pattern of the elements within. For instance when displaying a list, by saying 'first' the speaker points to the first object that appears on the list and by saying 'then' they point to the next.	…Now the **second point** I wanted to make was this whole business of the function is simply the protection of the young.	Young child is 'biologically biased' to develop attachments to its caregivers given its genetic endowment. Biological function of attachment is protection of the young
Direction & Demonstratives	The speech directly addresses the element such as 'this notion', or 'these things'.	So what is attachment then? Well **here's one description** which is ok, it's a long-enduring, emotionally meaningful tie to a particular individual.	A long-enduring, emotionally meaningful tie to a particular individual.
Reformulating the text & mangling	A form of semantic recognition marker for the text. Although the concepts are the same in speech and text, the speech can be so different in structure and terminology to the point where they are two separate entities which give the same semantic message.	Is it vital that the infant attaches to the mother and the mother figure alone?	Do infants need a close secure attachment with one figure over and above all others?

.

Each text element then was considered as a 'concept' that could be referenced, either explicitly i.e. using the same words, listing and directing or more implicitly i.e. by substituting or mangling words and sentences in the lecturers' speech. The procedures above were applied to the transcripts in order to identify integration of slide-text. The speech which did integrate a slide-text element was highlighted, and coded to reflect which element it was integrating (this process of matching speech with slide-text is explained in more detail in section 4.5.2 below). Once an initial coding of all of the transcripts in this way was completed, all of the possible procedures had been identified, so it was considered that the definitions of these procedures were adequately described. The data were then re-coded to verify the analysis, and finally subjected to a reliability check (as discussed in section 4.5.1.2) in order to cement the definitions of the procedures.

It should be noted that as much of the integration procedures rely on reading the lecturers' speech in its entirety before a section of speech[9] can be identified as integration or not, the identification of the starting point of an instance of integration was a difficult task. This task involved a judgement over the point that the student might pick up that an element was being integrated. It was decided that where the speech began to integrate the slide, for instance a recognition marker was used, this would be taken as the starting point for coding. However, coding would not be carried out until the remaining speech had been read, in order that it could be certain that it was integration rather than just a mention of the word. Also, where the lecturer used directives/ demonstratives or itemization, such as by saying 'this point', these were also considered to be the start point of the integration. Again the remainder of the speech was read first to ensure that they were not making an empty reference. This

[9] A 'section' of speech refers to the total speech which integrated the element, rather than the use of sentences, paragraphs and other grammatical markers.

categorisation process was clearly very complex, and open to biases in understanding each concept, and it is for this reason that the coding was checked by a second coder.

4.5.1.2 Reliability checking the pointing procedures

The procedures for identifying integration in the speech were utilised to provide instructions (Appendix 5) which were given to a second coder to code a randomly selected 10% of the slides for each lecturer. This process was carried out to test the robustness of the definitions of the pointing procedures outlined in Table 6. To check for interrater reliability, for each text element it was noted whether or not the speech was judged to be integrating the text by each coder. Thus each element was categorised as "integrated" or "not integrated" with the speech for each coder. Again, the specific procedure used for integrating was not noted. An interrater reliability analysis was carried out on this data using the Kappa statistic to determine consistency amongst the two coders. The interrater reliability for the coding was found to be in substantial agreement; Kappa = 0.844 ($p < 0.001$). Thus confidence was high that the process of judging whether or not the speech and slide-text were integrated was reliable.

The complexity of devising this analysis can be considered as the first important observation; that it is not always easy to identify when a text element is being integrated by the speech. This should be kept in mind throughout the thesis, as my rather difficult analytical task is the same as the students' task in the lecture. One important aspect of this difficulty was the extent to which the lecturer made an explicit, or a more subtle reference to the text. It seems that there are varying levels of explicitness in the procedures used to integrate slide-text.

4.5.1.3 A continuum of explicitness

It would be easy to understand that the lecturer is about to talk about something on the slide when the lecturer gives such explicit directions as saying 'this is…' However when the words are mangled, it is difficult to establish whether she was referring to anything on the screen at the time. It seems that the means of integrating slide-text vary in their explicitness. Here, an explicit procedure unmistakably points the audience to an element on the slide, whereas an implicit procedure results in the speech and slide expressing the same concept. Indeed, Knoblauch, Schnettler and Rowley-Jolivet all recognise that the slide can be integrated explicitly or more subtly. It is suggested then that these procedures, and further, the usage of these procedures, lie on a continuum of explicitness, from indirectly integrating the text into the speech to explicitly pointing out the text element being integrated. Yet it is not necessarily the procedure itself which is explicit or not, it is the lecturers' usage of it, or their combinations of use. Thus a directive used in combination with a recognition marker is more explicit than a directive used in combination with mangling the text.

Again, the quantitative measure of such procedures was not intended, yet it was identified that in examining the lecturers' individual usages of integration practices, the level of potential difficulty presented to the student might be further examined. This was carried out in two ways, firstly by a quantitative examination of the *patterns of* integration of slide-text with speech which is detailed in section 4.5.2.1, and secondly by a qualitative examination of *how* the lecturers integrated their text as detailed in section 4.5.3.1.

4.5.2 Individual lecturer differences in integration habits

Once a means of identifying where the speech was integrated with the slide-text meanings had been established, the analysis could focus on examining the patterns (or non-patterns) that might emerge in the extent to which lecturers integrate their slides. The next section outlines the quantitative patterns identified.

4.5.2.1 Expected versus observed pattern of integration

In examining individual differences in the extent of integration, and thus considering the difficulties that may be faced by students in the slide-lecture, it was necessary to identify the pattern in which it might be expected that the slide-text would be integrated. This would allow a comparison with the pattern that the elements were observed to be integrated, thus revealing the extent to which lecturers followed the structure of the slide-text with their speech.

Using the lecture transcripts, the text elements in the slide were given a letter according to the pattern in which it appeared on the slide. In cases where the lecturer was using animation schemes to reveal elements one-by-one, the identification of the pattern was simple to do. When the slide was displayed all at once however, it was necessary to make a judgement about the pattern of elements on the slide. It is recognised that there are a number of issues with this type of judgement, firstly that the judgements about the pattern of elements might be different to what the lecturer intended. However, it is the student's reading of the slide-lecture that is under consideration here, so the lecturer's intentions were not taken into account. Rather it was necessary to consider what cues the student might use in order to judge the pattern of slide-elements. In order to make these judgements then, it was assumed that for the most part slides are intended to be read from top to bottom and left to right. For instance, Figure 7 below shows an example of such reading along with its coding:

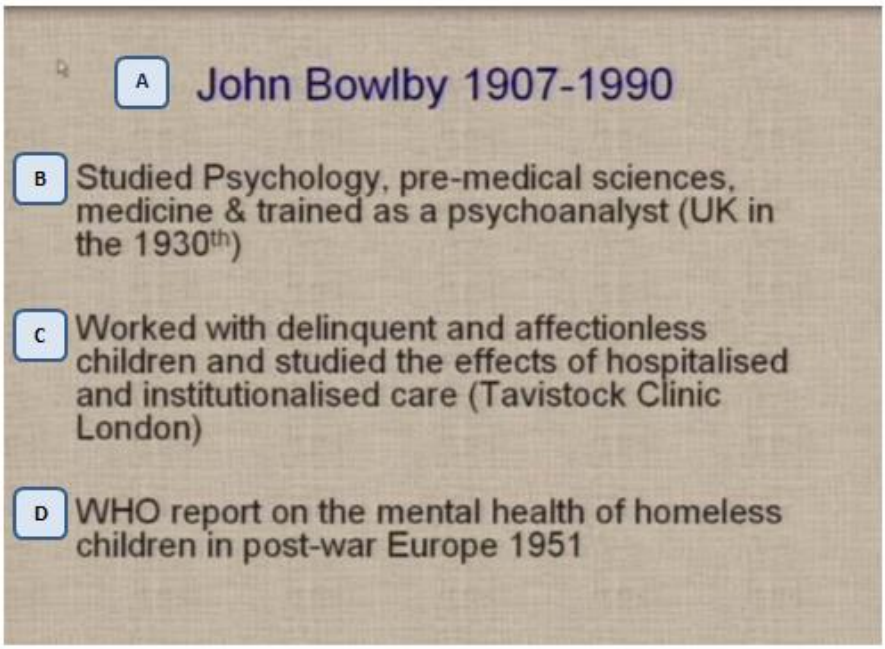


Figure 7: Example of coding of the expected order of slide-text

However, these spatial cues were occasionally unclear, such as in Figure 8 where the information was displayed in columns:

Figure 8: Example of column usage

On first glance it is unclear whether the points are intended to be read in columns, or left to right. In such cases then it was necessary to take into account the semantic pattern of the slide, for instance, here, the left hand column is detailing a definition whereas the right hand column tells us of the value of this definition. Thus it might be considered that the elements on the left are to be read first, and then the elements on the right.

The text elements were labelled, then, according to the specified lettering scheme (i.e. the alphabet) to reflect their identified position on the slide. Then the speech which integrated each text element could be coded accordingly, such that the coding produced an 'expected' pattern, and an 'observed' integration pattern. Figure 9 below is an example of such coding.

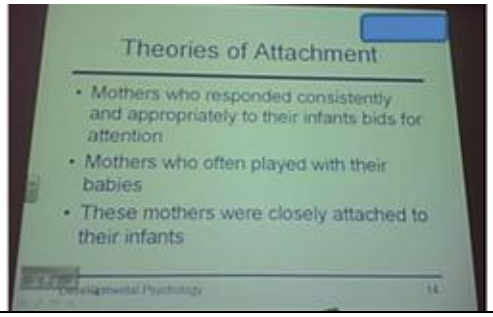
Expected pattern	Slide-text	Observed pattern	Speech transcript
A	Theories of attachment	None	What's more important is that
B	Mothers who responded consistently and appropriately to their infants bids for attention	B	mothers or fathers respond appropriately to the infant's needs,
C	Mothers who often played with their babies	C	that they play with the infants, when that ,when that
D	These mothers were closely attached to their infants	D	happens, these mothers become closely attached to their infants.
			

Figure 9 Example of coding of speech according to the slide-text pattern

Where a lecturer integrated more than two objects for instance by saying 'these two points', the speech was coded as both letters, such that the instance of

integration would carry two letters. However, where the speech integrated more than two elements for instance by saying ‘this slide’ this was not considered to be true integration of the text elements, rather it was considered integration of the slide as a whole.

Through this process it was possible that the speech that was committed to integrating the text elements was labelled according to which element(s) it addressed. It should be noted again that this analysis concerns only the speech in which the slide was integrated by the means of the pointing procedures described previously. The speech which develops on these elements further, introduces it or explains and expands on it and so on, was disregarded here.

The pattern that the letters appear in the both the speech and text transcripts were noted into strings of letters to represent the integration of the slide-elements for each slide. For example the expected pattern of the slide above would be A, B, C, D, but the observed pattern was B, C, D. This can be expressed visually through colour coding the patterns for each slide, as displayed in Figure 10 below. Here the most consistently matched lecturer (Dr. Jackson) is compared with the least (Dr. Leaman) as identified by statistical analysis of these patterns, outlined in 4.5.2.2. For each, the expected pattern is shown on the left and the observed pattern is shown on the right. Each row in the visualisation represents a single slide, and each block of colour represents an element within each slide. For clarity of the visualisation a colour scheme is applied to the elements to represent the expected pattern, which also represents how many elements were included in each slide. This colour scheme remains consistent for each slide. The colour patterns on the left then represent what one would expect if the lecturer integrates the elements in the expected pattern. The right hand visualisations represent the pattern in which the elements are integrated by

speech as observed in the transcripts. Using the colour scheme, the speech which integrates element A would always be coded as red, speech integrating element B would always be yellow and so on. Thus the visualisations show the order in which each element is integrated. Clear rows are those in which there were no text elements to be integrated.

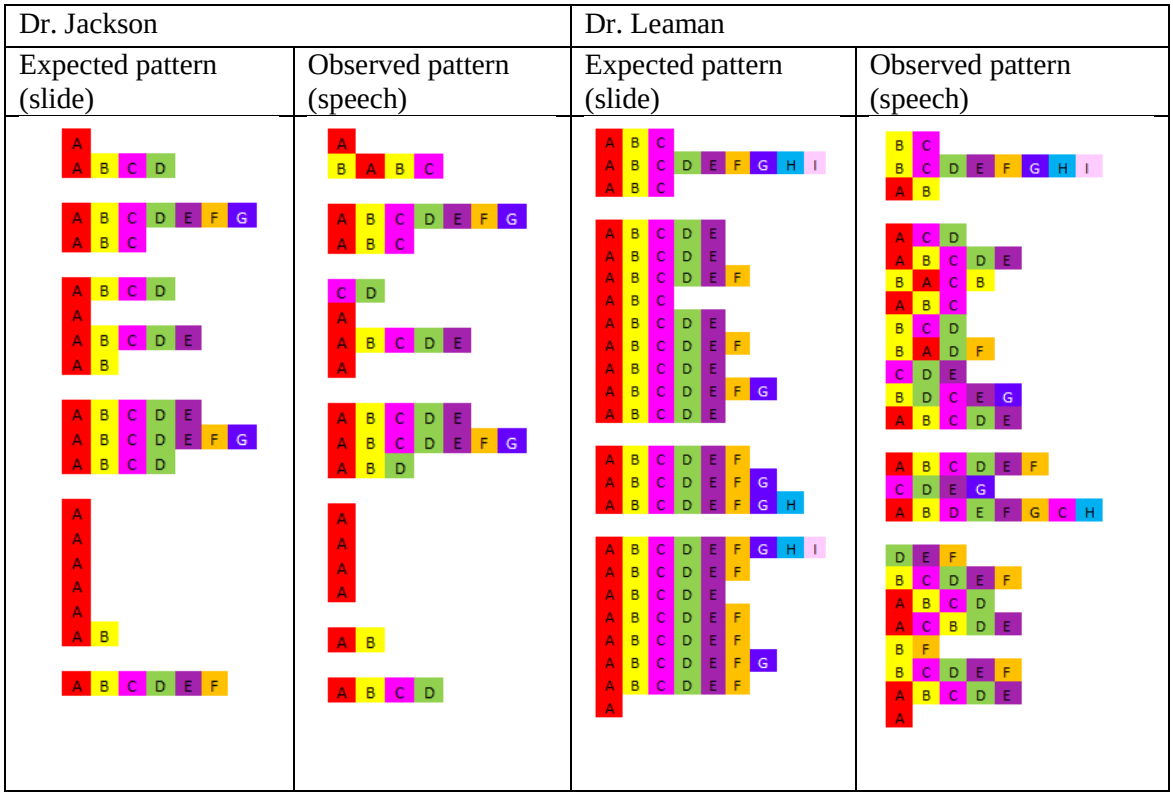


Figure 10 Visualisations of the matching of speech to slide-elements

In this way, it is possible to visually identify the extent to which the lecturer integrated the slide-elements in the order that would be expected given the slide. Where the observed pattern matches the colour scheme of the expected pattern, the lecturer matched the slide pattern exactly. It can be observed clearly that Dr. Jackson's observed pattern is fairly consistently well matched to the expected pattern, whereas Dr. Leaman's observed pattern is less well matched.

Through this procedure, it seemed that there were many instances in which the observed integration string was different to the expected string. Yet varying amounts of discrepancy from the expected string can also be seen in these two visualisations. It seemed appropriate to measure this discrepancy in order to give some form of 'integration score' to each of the lecturers, based on the extent to which their observed strings diverged from the expected string. Therefore, the strings of letters generated for the expected and observed patterns were used to produce a statistical representation, here referred to as an 'integration score', of the extent to which the lecturers matched or did not match the pattern of their slides with their speech. This procedure is outlined in the following section. It must be noted that at this point, integration scores would not be used to make assumptions about the pedagogical superiority or not of the lecturer's level of integration. That a lecturer was highly integrative should not be associated with good or bad practice at this point, as the student's position as the receiver of these integrations has not yet been fully considered. Questions' concerning what level of integration is more beneficial than others will be revisited later in the thesis. Thus in talking about following or not following the slide's pattern, it is not the intention to provide judgements as to the pedagogical value of these characteristics.

4.5.2.2 Scoring the integration

To assign integration scores then, it was necessary to employ a statistical model which would take into account the expected pattern of integration, and to award or penalise the speech based on the extent to which it matches or deviates from the expected pattern. It was reasoned that the expected and observed strings of letters could be compared using a string matching or edit distance algorithm, such as those

designed to identify differences in strings of letters, for instance in spell checking or text matching.

Navarro (2001) provides a summary and comparison of the different edit distance algorithms, such as the Hamming distance, and the episode distance. From this summary, the Levenshtein string distance statistic algorithm was identified as the most appropriate, as although the other algorithms examined by Navarro only measure either insertions, deletions or substitutions to a pattern, the Levenshtein algorithm measures all three. Although there would be no insertions, as the analysis only focussed on what existing text elements were integrated rather than examining and addition of material, it was useful to be able to measure deletions and substitutions together. For instance, where a lecturer missed out a text element, or integrated them in a different pattern to that expected. The Levenshtein string distance statistic measures the 'minimal number of insertions, deletions and substitutions to make two strings equal' (Navarro, 2001, p. 37) where all 'operations', or differences between strings, gain a score of 1. Thus the higher the score, the more changes would need to be made to one string to make it match the other.

Such a test could be carried out to test the lecturers' extent of following, or alternatively, of not following the slide's pattern based on what pattern of text integration would be expected given the slide, and what pattern was observed to be given by the speech. This was based on the assumption that the slide would provide the 'correct' string of letters against which the observed string of the lecturer's integration could be checked.

In order to apply the algorithm to the data then, the 'expected' and 'observed' strings were fed into an Excel spread sheet containing a Macro for the Levenshtein

edit distance algorithm (supplied by Inglis, 2012a). Using this algorithm, each slide was given a Levenshtein distance score which represents the minimum number of edits which would need to be made to the 'observed pattern' string, in order to match the 'expected pattern' string. Thus the higher the Levenshtein distance score, the further the observed pattern varied from what was expected. For example, comparing the strings for examples 1 and 2 in Table 7 below, there is a much bigger difference between the expected and observed strings between the two examples. In example 1, the string was not repeated at all, so there is no pattern to compare, meaning the Levenshtein distance between them equals the length of the string. On the other hand for example 2, there is only one letter missing from the observed string, meaning that the distance between the two strings equals the 1 missing letter.

Table 7: Example of comparison of scaled Levenshtein string distances

Example No.	Expected string	Observed string	Levenshtein Distance	Scaled Levenshtein Distance	Similarity score
1	ABCDEFGHIJ		10	1	0.50
2	ABCD	ABC	1	0.25	0.80
3	ABCDEFGHI	BCDEFGHI	1	0.11	0.90
4	A		1	1	0.50

However, this score alone does not take into account the respective length of the strings and as such cannot be used to compare one slide to another when the slides contain different amounts of text elements. This is because there will be a bigger difference if one item is deleted from a short sequence than from a long sequence (Ainsworth, Clarke and Gaizauskas, 2002). For instance, comparing example 2 and 3, both have only one letter missing so both receive a score of 1, despite there being more scope for differences in the longer string. To account for length then, these distance scores were then scaled by the length of the correct string sequence (i.e.

amount of text elements on each slide). Levenshtein distance scores were divided by length (in examples 2 and 3, these would be 4 and 9 letters respectively) to allow comparisons for the patterns on a 0-1 scale, or the 'scaled Levenshtein Distance'. However, this score suggests a limit to the level of difference between two strings, as example 1 and 4 both received the upper limit of 1, despite example 1 being 10 letters long and example 4 being 1 letter long. Thus the slides still could not be compared in a meaningful way. For this reason, the scaled Levenshtein distance scores were then scaled further into a 'similarity' measure in order to provide a more accurate statistical output. This involved a second rescaling to afford absolute limits to the scores (0 to 1) and also a reordering of the scores such that the closer to 1 the score gets, the more perfect the match between expected and observed strings (Inglis, 2012c). This is achieved by adding 1 to the scaled Levenshtein score, and then dividing this total sum by 1. The similarity measure then is a rescaling of the scaled Levenshtein distance, to provide a 0 to 1 scale where 1 represents an exact match and 0 represents infinite difference. Although this still suggests that there is a limit to the differences, it should be noted that absolute zero is impossible here, as in order to receive a zero, the scaled Levenshtein distance needs to be above 1. This score is only achievable if there are different letters *added* to the observed string than the expected, for example adding KLMN to example 2 above. This would not represent integration of the existing slide-elements; rather it would represent the *addition* of elements in the speech, which is impossible in this case. The formula for the similarity measure is as follows:

$$Similarity = 1/(1+dist).$$ (Inglis, 2012b)

At the extremes, if there is a Levenshtein distance of zero, this would receive a similarity score of 1 (1/ (1+0) = 1), and would imply that the lecturer follows the slide's pattern without missing anything out, meaning the observed structure matched the expected structure perfectly. If there is a large Levenshtein distance there would be a similarity score close to 0 (1/ (1+n) = smaller score) and would imply that the lecturer integrates the slide-elements randomly, or doesn't integrate the slide at all. The closer the score gets to 1 then, the more perfectly the speech matched the slide.

The lowest score received for any of the slides was 0.33, and the highest was 1. Mean scores were calculated for all of the slides for each lecture. As this score is unique, the significance of the mean scores was not immediately identifiable. As the similarity score has a limit of 1 indicating a perfect match, it was considered that the closer to 1 the mean was, the more consistently integrated the slide-text for that lecture. Table 8 below shows the mean similarity scores for each of the lecturers in this sample, in ascending order, along with standard deviations around this mean to indicate the average consistency or inconsistency throughout the lecture.

Table 8: Table of similarity scores for Phase 1 lecturers

Lecturer	Similarity Score	Std. Dev. Similarity
Dr. Leaman	0.69	0.16
Dr. Wright	0.71	0.13
Dr. Vickers	0.71	0.15
Dr. Cooper	0.72	0.13
Dr. Kemp	0.76	0.14
Dr. Underwood	0.78	0.21
Dr. Horsley	0.79	0.14
Dr. Ealy	0.80	0.15
Dr. Moss	0.80	0.20
Dr. Lake	0.86	0.18
Dr. Jackson	0.89	0.17

If these scores are considered to be representative of the consistency of matching the expected structure, it appears that all lecturers in this sample showed

some level of adhering to, or following their slide pattern; however none of the lecturers received a score of 1 which would indicate a perfect match throughout. It seems that it is indeed true that lecturers rarely read their slides verbatim. Instead they have rather more inconsistent relationships with their slides.

Using the similarity scores for each slide of each lecture, a one way ANOVA was applied to test for differences between the lecturers in the extent to which their observed patterns matched their expected patterns, using the individual slides as the population and lecturer as the factor. Lecturers differed significantly from each other in the similarity of the speech to the slide, $F(10, 364) = 3.801$, $p = <0.001$. Thus it could be concluded that there are characteristic differences in the extent of integration of text elements between the lecturers, thus their following of the slide pattern.

4.5.3 Considering the lecturer's relationship with the slide

That there are differences in the extent to which lecturers integrate their slide-text is interesting, but tells us little of the qualitative differences in slide-lecture practice. In considering the slide-lecture experience, it seems important to examine what these differences might be. Schnettlers' (2006) two approaches to the 'orchestration' of a slide presentation are one in which the speaker is the orator of the slide material, and one in which the speaker is the 'performer' of the slide material. Here the former involves limited explicit addressing of the slide material with the speech such that the slides act as 'wallpaper', and the latter involves the presentation being guided by the slide material, such that the speech is considered to be articulating the slide. The integration scores might allow us to guess which of these relationships the lecturers fell into, for instance, if the lecturer was highly integrative, it was possible that they read out the slide-text, and thus would be considered a

'performer'. On the other hand if they received a low integration score, their limited addressing of the slide would suggest that they were 'orators'.

However, as identified in 4.5.1.3, the integration lies on a continuum of explicitness. This means that although a lecturer might score highly for integration, they may be consistently integrating implicitly such as by mangling the slide-text, rather than using such explicit means as reading out the slide-text. Also a lecturer who integrates less comprehensively might do so explicitly, by drawing their students' attention to certain elements and not others. Further as Schnettler points out, although the speech might parallel the structure of the text on the slide, the structure of the speech has its own characteristics which set it apart from being a mere replication of the slides. These characteristics are likely to be important to the student, as they would identify for students what they are supposed to be doing with the slide-text, for instance whether they should be looking at it, thinking about it, accepting it or disagreeing with it. As mentioned in section 4.5.1, there is a category of speech in which the slide is not being integrated for example expanding, explaining, questioning, commenting, asides and so on. Although not indicative of whether or not the text is being integrated, such things are important to the relationship, as it identifies for the student what the slide-text is being used for (for example as a headline for speech or as a subject of debate). Schnettler calls the employment of such relationship cues the 'orchestration' of the presentation.

Through analysing videos of presentation performances, Schnettler (2006) identified two activities by which a presentation can be orchestrated: 'translating' and 'conducting attention'. Here the performance as a whole can serve to decipher the slide-text for the audience ('translating'), or to direct them to particular elements at a particular time ('conducting attention'). In this way, the audience is helped to

understand what the role of the slides is in the presentation, and therefore what they should be doing in response to it. However it was noted during the analysis of integrations that there were other practices not covered by these two categories, such as the lecturer contradicting the slide-text, or highlighting why it was important. Although the statistical analysis represents the comprehensiveness of speech echoing slides, the way that slide-text is being used by the lecturer requires another analytic approach. In order to consider how the speech might reveal anything about the lecturers' relationship with their slides, and therefore provide cues as to what students should be doing in response to the slide-lecture, a qualitative DA approach was taken. This involved the analysis of not only the speech that identifies integration, but also the speech surrounding integrations focussing on what the lecturer appeared to be doing with their integration of text. This process is detailed next.

4.5.3.1 Caricatures of the slide-lecture

Utilising the lecture transcripts containing both the speech and slide-text allowed a DA on the speech sections along with a consideration of the elements which were being spoken about. The analysis focussed on the actions that the speech performed in relation to the slide-text, using Schnettler's activities as a starting point. Thus the extent to which the speech 'translated' or 'conducted attention' was identified. This analysis was also intended to uncover any further activities which were carried out by the speech. This identification was based on considering what actions the speech appeared to be carrying out in relation to the slide-text. However, it was considered that rather than carrying out this analysis on all lectures, a more revealing approach would be to consider the two lecturers who were quantitatively different in their approach to integration, to consider what the qualitative differences between them might be. The highest and lowest scoring lecturers were treated as the

two extremes of approaches to slide integration, with the highest score being the most integrative and lowest score being the least.

Figure 10 (page 142) displays a visualisation of the patterns of integration that these lecturers exhibited, which invokes the idea that that the two lectures might have been quite different experiences for the audiences. The following section contains a qualitative description of two slides from the highest and lowest scoring lectures using a DA approach, in order to identify specific practices carried out by the lecturers which might reveal these qualitative differences. This analysis was also performed for the remaining slides in each lecture as outlined in section 4.5.4, in order to establish the extent to which different practices were employed through the lecture. Taken together, these analyses are then employed to consider the extent to which integration of slide-text might reveal anything about a lecturers' relationship with their slides.

Dr. Jackson was the most integrative lecturer in this phase of the research i.e. his observed patterns of integration most closely matched the expected pattern. That this lecturer integrated his slide-text consistently might imply that his approach was closest to the 'reading off the slide' practice, or to Schnettlers' 'performer' approach. Indeed on closer inspection, this was often the case, for instance the below slide (Figure 11) shows very close matches between the speech and slide-text. This is particularly evident in his integration of element E, F and G.

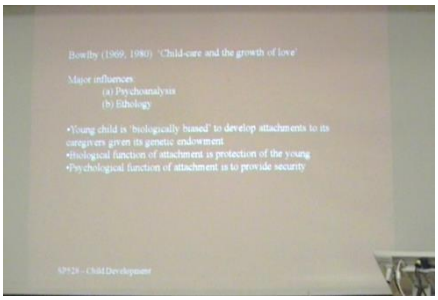
Slide-text element label	Slide-text	Slide-text element being integrated	Speech
A	Bowlby (1969-1980) 'Child care and the growth of love'	A	**…Now John Bowlby came along and he wrote this book, which at the time caused a lot of controversy,**
B	Major influences:	None	at that time because it was saying: hold on a minute, there could be a real problem here with mothers going to work. And the problem is to do with this business of attachment. So he caused a lot of trouble and he wasn't very popular. But it was a very controversial book at that time.
C	Psychoanalysis		
D	Ethology		
E	Young child is 'biologically biased' to develop attachments to its caregivers given its genetic endowment.	B	**And he, his major influences on this, on his writing, which**
F	Biological function of attachment is protection of the young	None	really, he was really the first person in psychology, apart from Freud of course much earlier, to really begin to pull out the significance of this relationship and he did for two reasons,
G	Psychological function of attachment is to provide security	C	**one a lot of his ideas came from psychoanalysis,**
		D	**but also from another branch of the natural sciences called ethology.**
		E	**And OK, here's some fairly obvious basic ideas about it, a young child is biologically biased to develop attachment to its caregivers given its genetic endowment.**
		None	Now we noticed last week when I was talking about infancy, the curious business about imitation which looks as if maybe it just has to be something that's built in, and now we've got something else, well, hold on a minute,
		E	**biologically biased to develop attachments to its caregivers**,
		None	well, in an obvious way it might make sense, but teasing apart actually
		E	**what that means, what the implications of that are actually,**
		None	is more difficult.
		F	**Now the second point I wanted to make was this whole business of the function is simply the protection of the young.**
		None	Right, it looks like a fairly, is it therefore he was asking, a kind of automatic phenomena
		G	**And the function of it psychologically is to provide security.**

Figure 11: Example of a highly integrated slide by Dr. Jackson

Here, the way in which the slide-text is integrated is interesting. In the most part, it does appear that the elements are being spoken *about*, rather than that the text is somehow being performed. For instance where the speech first integrates slide-element E, the lecturer says 'and here's some fairly obvious basic facts about it',

which provides a context for the following speech; he will be reading out these obvious and basic facts. Such an act might be considered to be *conducting attention* to the slide-element, using a directive to identify that the text will be integrated. Here it can be assumed that the lecturer wanted to draw his students' attention to the particular element. Yet he wanted to do so in order to classify them as being 'obvious' and 'basic'. However, once the slide-text is read out, or *verbalised*, he does not *translate* the text. Rather he follows it by *questioning* the text using information previously learned. That he says 'now we've got something else, well hold on a minute' before verbalising the slide-text again suggests to the audience that what is written on the slide is questionable in some way. Then he follows this with suggesting that if we attempt to pick it apart it is rather difficult. Here it seems that the lecturer is almost *disagreeing* with the slide-text, or else pointing out that although such a point has been made and provided in the lecture, it does not necessarily mean that it is a simple fact to be digested. Rather the students should be considering it in light of what they learned in the last lecture.

The lecturer includes some extent of *translation* into the speech, i.e. in explaining the text or otherwise deciphering it for the audience. For instance where he integrates element C, he integrates the text and follows this by translating it by saying 'so, you know…' Mostly though, the lecturer seems to signal that the text is self-explanatory, and as such it seems that he is not using the slide-text as an object which needs to be explained to students. Rather his relationship with the slide appears to be based on his indicating, or referring to specific elements in order to assess them. There were many further examples of this lecturer talking about the slide-text in such a way. For example Figure 12 below:

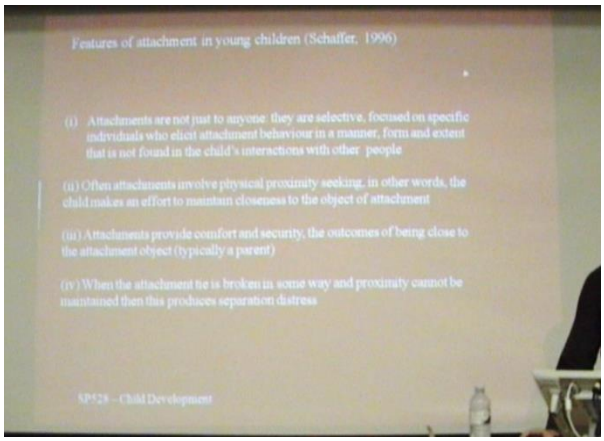
Slide-text element label	Slide-text	Slide-text element being integrated	Speech
A	Features of attachment in young children (Schaffer 1996)	A	**Here's some features of it**
B	Attachments are not just to anyone, they are selective, focused on specific individuals who elicit attachment behaviour in a manner, form and extent that is not found in the child's interactions with other people	None	I think are worth kind of just reminding you about. I'm not, just, they're not particularly, I'm not going to go into lots of detail but I think they're important.
C	(ii) Often attachments involve physical proximity seeking; in other words, the child makes an effort to maintain closeness to the object of attachment.	B	**Attachments are not just to anyone. Now we notice that, he's saying that**
		None	but remember at the very beginning you get this social responsiveness for the first couple of months but that's not attachment. You know what I mean; it's simply a sort of responsiveness.
D	(iii) Attachments provide comfort and security, the outcomes of being close to the attachment object (typically a parent)		
E	(iv) When the attachment tie is broken in some way and proximity cannot be maintained then this produces separation distress	B	**They are selective, focused on specific individuals who elicit attachment behaviour in a manner, form and extent that is not found in the child's interactions with other people.**
		None	I kind of know what it means because my mother can still really get to me. Ha-ha I shouldn't admit that should I? She can just go 'oh yes well you were always a bit of a ha-ha' you know and, Ok, alright!
		C	**And secondly, often attachments involve physical proximity seeking in other words, in other words, the child makes an effort to maintain,**
		None	so you know, the child actually makes an effort, there's an intentional display of actually I want to be with you, I want to be with this figure. You know without that it's really hard to say you've got attachment.
		D	**Attachments provide comfort and security, the outcomes of being close to the attachment object. That's fair enough**…

Figure 12: Example of talking about the slide-text by Dr. Jackson

Here, before reading out the list of features that appear on the slide (B, C, D), the lecturer notes that he thinks these features are important to remember, although he won't linger on them. This might suggest that the students just need to learn them. In this way the lecturer might be *signalling the importance* of the slide-text to the general thesis of the lecture. The lecturer follows the reading of the first item on the list (B) by linking back to what was previously learned to help explain or *translate* the statement; that responsiveness in attachment is more than just the general social

responsiveness that infants display early on. It is noted though, that later the lecturer *agrees* with the text by saying ‘I kind of know what it means’. This is also evident after he integrates element D, by his saying ‘that’s fair enough’.

It seems that although this lecturer most consistently addresses his slide-text, he does so predominantly in order to provide an assessment of it, or to question it. The lecturer does not seem to be using his slide-text as a script to tell him what to talk about, but instead uses it as an artefact of reference for the lecture, which will be appraised by the speech. This ‘referring’ style is particularly salient when compared against the practices of the lowest similarity scoring lecturer; Dr. Leaman. In comparison to the above examples, the way in which the slide-text is integrated by this lecturer seems to be a different type of relationship. Dr. Leaman does not seem to be assessing the slide-text; rather the slide-text is more subtly woven into her speech. In Figure 13 then, the lecturer is less obviously addressing the slide-text, such that if the speech were read alone it might be impossible to tell that there was any text on the slide at the time.

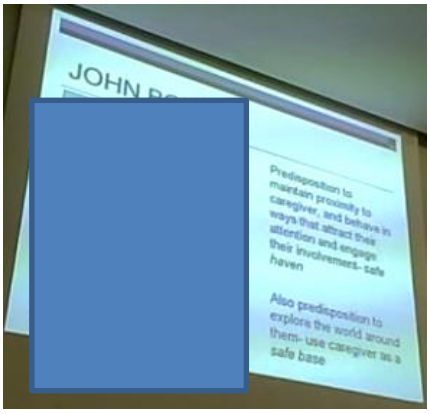
Slide-text element label	Slide	Slide-text element being integrated	Speech
A	JOHN BOWLBY	A	**Bowlby**
B	Predisposition to maintain proximity to caregiver, and behave in ways that attract their attention and engage their involvement – *safe haven*	None	suggested that young people have
		B	**a predisposition to maintain proximity to a caregiver, and this is the heart of attachment this is what attachment is about, it's about maintaining proximity**.
C	Also predisposition to explore the world around them – use caregiver as a *safe base*	None	It's about staying close to somebody who's going to look after you because of course: infancy is a very dangerous experience. If you're helpless you can't feed yourself, you can't clothe yourself, you need someone else to look after you. You have to elicit care from somebody else if you can't do it yourself. Ok, so this is what attachment is all about. And it's what attachment is all about all the way through life as well. So this idea about felt security, about keeping somebody close, that's what attachment is about.
		B	**And Bowlby talked about safe haven behaviours**
		C	**and safe base, secure base behaviours.**
		B	**Ok so safe haven behaviours are this predisposition to maintain proximity to the caregiver, behaviours that attract the attention of the caregiver, and engage their involvement...**

Figure 13: Example of a little integrated slide by Dr. Leaman

Here the boundaries between slide-text elements in the speech are less marked, as evidenced by the first speech sentence. The title text (A) is *merged* together with B in the same speech sentence. This merging is also evident in her integration of elements B and C in which she integrates specific words from both into the same sentence. Here, she skips the majority of the text to *merge* the two phrases written in italics on the slide: 'Safe haven' and 'Safe base', before going on to define or *translate* these phases separately afterwards ('ok, so safe haven behaviours are…'). Here the lecturer is speaking the concept before explaining it, such that the students need not see the concepts on the slide, rather they can refer back to what was just spoken. What is more evident here is the extent of *translation* of the slide-text being carried out, as much of the slide-text is explained in other terms without explicitly referring to it. Also, in the integration of the text, the lecturer appears to make more of

an effort to *combine* the speech and text into a single story, as opposed to Dr. Jackson's approach which served to separate them. This is clear in Figure 14 below in which the lecturer seems to be more subtly integrating the words appearing on the screen.

Slide-text element label	Slide	Slide-text element being integrated	Speech
A	ATTACHMENT	None	Now when we talk about
B	Infant expression of emotion and caregiver's response	A	**attachment,**
C	How do we conceptualise the attachments we see between children and their parents? 	None	often people know what we mean when we talk about parent child attachments or child parent attachments. And most of this work is based on how the
		B	**infant expresses emotion and how the caregiver responds to that emotion,**
		None	and one word before we go on about the term attachment, attachment from the developmental literature is always from child to parent, so children are attached to their parents, but parents are not under usual circumstances attached to their children. Ok? And that's quite an important distinction to make. So what we need to think about is when we're looking at parental and child interactions and we're looking at this dyad interacting together,
		C	**how do we conceptualise what the attachment is? So this bond between parents and their children, how do we conceptualise it**

Figure 14: Example of subtle integration of a slide by Dr. Leaman

In the integration of element B the words are woven into the lecturer's sentence by the lecturer saying 'and most of this work is based on how the…' Here the speech appears to be putting the slide-text into a complete narrative such that the text carries the main information that needs to be said, whereas the speech serves to convert the text from solitary phrases to a more articulate narrative. After integrating element B, the lecturer adds some information to the narrative, by adding 'one word before we go on'. This appears to be serving as an extended *translation* of element B, as she is explaining the importance of the direction of the emotion being expressed.

Overall, this lecturer seems to be using the slide-text as some form of flexible scaffold for the lecture, in which the text is not assessed, rather it becomes a part of the speech. Further, the role of the speech as a translator of the slide-text is more obvious. That the slide-text is blended into the speech in such a way may be the cause of the low integration score, as the lecturer does not need to address each element separately to provide a separate assessment.

This analysis has established that there are some qualitative differences between these two lecturers, which might reveal what the lecturers were using their slides for. The next section presents a quantification of the different speech acts that were performed by the two lecturers which can be aligned with two different kinds of relationship between speech and slide.

4.5.4 Functions of the speech-slide-text relationship

The two lecturers' approaches do appear to fit Schnettlers' descriptions to some extent. Dr. Jackson (high similarity) did indeed seem to read off the slide such that his speech often said the exact words that were on the screen. He might be considered to show a 'performer' approach to slide-text integration. Further, Dr. Leaman (low similarity) displayed a relationship in which it was not always obvious that slide-text was being addressed. As such it might be considered that the relationship displays similarities to Schnettlers' 'Orator' in which the slide is treated as wallpaper.

However, when the lecturers' apparent usage of the slide-text is considered, these relationships begin to become less applicable. Whereas the first lecturer appears to be assessing the slides, the second seems to be blending the slide-text into her speech in order to translate it. Dr. Jackson appears to treat his slide-text as information

to be questioned or to be further considered, whereas Dr. Leaman appears to treat the slide-text almost as a script or prompt for her speech to translate. It seems that when further considering the lecturers speech in relation to the slide-text, Schnettler's relationship types do not wholly represent the practices being employed and thus it might be concluded that Schnettlers' speaker-slide relationship types might not hold in a lecture situation. Based on considering the practices of both the most and the least integrative lecturers, it is here proposed that there are two functions of the speech-slide-text relationship in slide-lectures;

1) the 'referent' function, characterised by the lecturer providing an assessment on the slide-text, and
2) the 'scaffolding' function characterised by the lecturer's speech blending and translating the slide-text in the lecture narrative.

The same kind of analysis was carried out on the remainder of the lecture for each of the two lecturers in order to consider the extent to which the lecturers display characteristics of one kind of relationship over another. This analysis was based on the speech acts which emerged from the DA approach outlined above. The speech acts were separated into the two relationships that they appear to indicate, and instances in which they occurred were recorded throughout the whole lecture transcript. Here 'conducting attention', 'questioning', 'agreeing/ disagreeing' and 'signalling importance' were considered to be acts which are used when a lecturer refers to his slide-elements, as they serve to separate speech from slide as two distinct aspects of the presentation. Verbalising also fits here, as it was considered that in verbalising the text the lecturer draws attention to the text on the slide, and again highlights the distinctness of speech and slide. 'Merging', 'translating' and 'combining' are considered to be aligned with the 'scaffolding' relationship, as these

serve to combine the speech and slide information into a single message. In this way the speech and slide-text are not identified as distinct messages. This quantitative analysis is detailed in Table 9 below.

Table 9 Table quantifying the extent to which lecturers display characteristics of the 'referent' and 'scaffolding' relationships

Relationship alignment	Speech act	Dr. Jackson			Dr. Leaman		
		Count	% of occurrences (88)	Total % for relationship	Count	% of occurrences (203)	Total % for relationship
Referent	Conducting Attention	13	14.77	70.45	17	8.37	21.67
	Questioning	2	2.27		1	0.49	
	Agree/disagree	6	6.82		1	0.49	
	Signal Importance	6	6.82		1	0.49	
	Verbalising	35	39.77		24	11.82	
Scaffolding	Merging	1	1.14	29.55	27	13.30	78.33
	Translating	9	10.23		39	19.21	
	Combining	16	18.18		93	45.81	

The table shows that Dr. Jackson employed indicators of a ‘referent’ relationship in 70.45% instances of integration throughout the lecture, whereas Dr. Leaman employed them in 21.67% of instances of integration. On the other hand, Dr. Jackson employed indicators of a ‘scaffolding’ relationship in 29.55% of instances of integration, compared to Dr. Leaman who employed them in 78.33% of instances of integration. A χ^2 analysis was carried out to compare the total number of speech acts within each relationship type that the lecturers produced. The difference in relationship indicators between lecturers was significant χ^2 (df: 1, N=291) = 63.08, $p < 0.001$. Thus it was concluded that the lecturers differed significantly in the relationship indicators that they employed in their lectures.

4.5.4.1 Reliability of the indicators

The indicators identified were checked for reliability by employing a second coder. They were given the slide examples provided in section 4.5.3.1 above, along with descriptions of the speech acts (Appendix 6). The coder was asked to identify

whether the speech acts were present in the four examples and how frequently they occurred. This was then compared against the same coding performed by myself. It should be noted that the second coder was given the entire slide-speech transcript for the above slides, yet the examples above are clipped.

An interrater reliability analysis was carried out on this data using the Kappa statistic to determine consistency amongst the two coders. The interrater reliability for the coders was found to be in substantial agreement; Kappa = 0.846 ($p < 0.001$). There was high agreement between the two coders that the same speech acts were being carried out for the four slides above. Thus it was assumed that the coding of speech acts was reliable. The next section outlines what the findings of this analysis mean to slide-lecture practice.

4.5.4.2 Is there a relationship between consistency of integration and the lecturer's relationship with the slide?

It does seem that the highest and lowest scoring lecturers in terms of integration also display quantitative differences in the way in which their slide-text is treated. The highest scoring lecturer for integration displayed more indicators of a 'referent' relationship than did the lowest scoring lecturer. It may be suggested then that a lecturer who is treating their slides as some form of referent might be more concerned with consistently addressing each element on the slide and following the pattern of the elements appearing on the slide, whereas the lecturer using their slides as a scaffold might be less concerned with such following of the slide-text.

However it must be noted that although the two lecturers show significant preferences for different approaches, the lecturers did not consistently display characteristics of only one relationship. Rather their treatment of the slide-elements

can be characterised by a mix of both relationships. All of the practices seemed to be carried out by both lecturers in at least one instance during the lecture. Thus it is acknowledged that the actions that the speech carried out can be adapted for both functions. Thus the function of slide-text might vary both between and within lectures, and might depend heavily on how the lecturer intends to use each element. Yet as a consequence of both lecturers utilising the different speech acts identified, it seems that the lecturers' relationship with their slides is not something that is immediately evident and as such these relationships need further empirical examination. It was decided that this examination would provide a particular focus of the data collection and analysis for Phase 2. Yet it can be noted that the apparent differences in usage potentially present difficulties to the student who has to work out what the slide-text is being used for. Thus I now turn to considering the students' position in response to the slide-lecture.

4.6 Problematizing the slide-lecture: Considering the students' predicament

As this phase of research set out to describe lecturer practices, student data was not collected. However it is important to consider what might be their experience in response to the slide-lecture in order to shape questions to be asked during further data collection. In analysing the data, it was recognised that the identification of integration in the speech is essentially the same task that students might be faced with in a lecture. Therefore my own experiences in performing the analysis might be drawn upon to consider the students' response. Additionally, during the analysis a reliability check was carried out on the coding of integration of the text by speech by a second coder. Thus in assigning the reliability checking task to a second coder, they were also being assigned the task of the student in the lecture; to identify where the lecturer

integrated the slide-text. It was considered that both the analysis process itself and the reliability checking process might be utilised help formulate questions about the student experience.

4.6.1 What can be said about the students' experience of the slide-lecture?

Largely the coding was similar across both coders and as such it could be concluded that A) the procedures for identifying integration were fairly robust, but also that B) different student's experience of identifying the speech-slide relationship might not be wildly dissimilar. Thus it is possible that students are equally capable of identifying and classifying integration. However, there are two major issues in relating this process to the students' learning experience. Firstly, this conclusion is based on the decisions of two coders who had the luxury of time to consider the integration. Secondly, that there was even a small amount of inconsistency of experience between coders is important as this might have implications for learning. Yet regardless of differences in coding, it is acknowledged that students might expect that the slide-text is addressed in a certain way.

Although, as yet, there is no student data to support or reject this claim, it seems that the context of slide-lectures does provide support. As the slide-text is commonly regarded as the lecture outline (Adams, 2006, Craig and Amernic, 2006), it seems fair to assume that students expect that the text would be used as a guide to the lecture. Thus it might be said that students expect the lecturer to employ a 'referent' relationship, rather than a 'scaffolding' relationship. For this reason it was assumed that the students' understanding of the pattern of the slide-text elements is important to their following of the lecture. Thus the identification of the pattern and the barriers

that impact on this identification are important considerations when examining the student's position in the slide-lecture.

Statistical analysis of the extent of integration shows that it was rarely the case that the lecturer addressed all of the text elements that were included in their slides, in the pattern that they appeared on the slide, and certainly never the case that the pattern was followed throughout the whole lecture. So it seems that whether or not their students expected that the slide pattern was followed consistently, the lecturers never did so. This is contrary to previous observations of slide presentations which claim that presenters either simply read out their slide-text or else use it as a guide for the presentation (Norvig, 2003, Young, 2004, Maxwell, 2007, e.g. Schnettler, 2006).

Perhaps a more significant concern however is that it seems that in employing the 'referent' relationship, the lecturer is going *against* the expectation that the slides can be used as a guide to the lecture. Indeed in the case of Dr. Jackson, who occasionally disagreed with, and even questioned some of his slide-text, it would be foolish of students to assume that the slides are always being used in such a way. Alternatively, for those employing a 'scaffolding' relationship, it is possible that the integration of the slide-elements might be missed by students, as the lecturer tends to blend the text with their speech. The boundary between what is said on the slide and by the speech seems to be blurred in this case, meaning that students might be confused about what is the role of the slide-text in the lecture, specifically whether they should be looking at it or using it at all.

A number of questions therefore remain for further study into the student experience, including whether or not students look for integration in lectures and how easy is it for students to identify integration and the identified relationships in the live

lecture situation. Does ease of identification have any implications for their learning experience? Does it matter to students when text is not integrated? And finally, what might be the consequences of their not identifying integration or the relationship that their lecturer has with their slides? This study highlights that the students' position in the slide-lecture is worth considering further. Before Chapter 5 outlines a study which addresses such questions, the analysis will be discussed further, in order to assess whether the research questions have been adequately addressed.

4.7 Discussion

This chapter sought to consider slide-lecture integration practices in relation to text elements. It was based on asking the question: to what extent does the lecturer's spoken exposition integrate with the text in slide-lectures? It was found that although there is much variety in the options available for representation in slide-lectures, text was the most commonly employed representation in the lectures. Within the usage of text though, there was also found a variance within the practices of integration of slide-text. Not only were there a range of ways that lecturers can achieve integration of their slide-text, which might vary in explicitness, also lecturers varied in the consistency of their following of the structure of the text on the slides when integrating it with their speech. Moreover, lecturers varied significantly from each other in the extent to which they integrate their slide-text consistently. It is suggested that this variation might be due to differences in the way in which the slides are being used, either as an artefact of reference, or as a scaffold for the speech.

In terms of the student's position in the lecture, it was found that the experience of attempting to match the speech with its corresponding slide-elements was fairly consistent between two coders, suggesting that the slide-lecture experience

might be fairly consistent across students in terms of identification of integration. Yet owing to the possible expectation amongst students that all text will be spoken about, and the varying levels of explicitness with which it is achieved, it is suggested that the students' position in identifying integration is, nevertheless, potentially problematic. However, it must be acknowledged that the analyses are not free from critique. The next sections examine these analyses to assess the extent to which credible conclusions can be drawn.

4.7.1 Identifying integration

It was noted that the coding of the integrations was not a straightforward process. Knoblauch (2008) provided crucial understanding about the indicators the audience might use to identify where PowerPoint slides are being integrated into the lecturers' speech. The procedures can be considered as means of exhibiting a duality of structure between speech and slide. In applying these indicators to the 11 lecture transcripts it was possible to identify where the slide-text was integrated into the lecturers' speech, and also identify additional procedures by which it was achieved. Yet the procedures for integration were constantly being revisited and revised when classifying integration of elements. This arose from the difficult decision making process around instances of ambiguity; for instance, where it was uncertain whether the lecturer was either making a very subtle reference or was not integrating the slide at all.

In cases of ambiguity it was necessary to consider the task faced by students during lectures; i.e., that they need to make quick decisions about whether or not an element is being integrated. That I found it difficult given the leisure of time to carefully consider each sentence spoken in relation to the slide tells us something of the students' position during a live lecture situation, which may be problematic. It

also reveals that the boundaries between the different procedures might not be very clear. For this reason it was obvious that a quantitative measure of the appearance of each type of procedure would not be very revealing in respect of integration practices.

However, the notion of explicitness is also rather problematic and, in fact, it could be that the more extremely explicit or subtle procedures are actually different procedures altogether, rather than merely different approaches to the same procedure. As the identification of the integration was done in the absence of lecturer data, it is difficult to say if, for instance, the integration of a slide or element was intended to be subtle or if it might actually be unintended or incidental. In order to make these decisions one would need to ask the lecturer. However this is something that is unlikely to happen during a lecture and was not possible during this analysis. It is recognised that this difficulty might have resulted in inaccurate coding of the more ambiguous cases. Therefore the decisions made during the analysis might be questionable, yet this is an important finding in and of itself when considering the student's position. This issue becomes even more important when considering the students' ability to work out what the slides and speech are being used for during the lecture.

4.7.2 Identification of speech-slide relationships

Of the admittedly limited analysis that is possible here in the absence of data on the intentions of lecturers, it was proposed that there are two ways in which a lecturer might use their slides. It was considered that an informative approach would be to consider the two ends of the continuum of harmony of integration, to look closely at what these lecturers are doing. In pursuing this, it seemed that the lecturer who paid most attention to the pattern of the elements on the slide was using his slides as some form of referent and, as such, consistently integrated the majority of the text

elements on his slides. It is possible that this lecturer intended for his slides to perform the role of an artefact to be explained during the lecture, and so made sure to talk about each element included. By contrast, the lecturer who paid least attention to the pattern of the text seemed to be using it in a different way, more like a scaffold for her speech. It is possible that this lecturer intended for her slides to take the role of an outline which needed to be addressed by the speech. However it seemed that she did not consider it to be crucial to go through this outline in its entirety.

These relationships appear to be reflected in literature commenting on PowerPoint practice, yet it seems that most often it is the 'scaffolding' relationship described. For instance Adams' (2006) view of the PowerPoint culture points to a common understanding of the role of slides as being where the lecture resides. In this view, the information contained is to be elaborated by the lecturer through their verbal exposition. This practice, she argues, defines the pervading PowerPoint lecture culture. Further Maxwell's (2007) critical account of the prevailing role of PowerPoint is that it provides a summary for the lecture, which is repeated during the lecture by the lecturer. He argues against this which he considers to be common practice, in which the slideshow is used as a device to remind both students and lecturers what the lecture was about (Maxwell, 2007). In this way, Maxwell's account of the typical lecture slideshow is one in which the lecture is scaffolded by slides, with the task of the lecturer being to expand on it, and the task for the student is to take notes on anything that is said that isn't already on the slides. Indeed, as Farkas puts it, 'In a PowerPoint presentation, the oral dimension largely takes the form of the oral gloss, or elaboration, on the slide-text and graphics. (Introductory remarks, extended digressions, and Q/A discussion are distinct from the oral gloss.) Furthermore, there is a very close relationship between the [slide] deck and the gloss.'

(Farkas, 2007, p. 6). This seems very similar to the 'scaffolding' type of relationship identified in which the slide-text is blended into the lecturers' spoken narrative. As Maxwell seems to suggest, this kind of relationship is a very simplistic lecture practice as the lecturer simply talks through each of the points in turn. Yet as this analysis has identified, this predictable level of integration is not always the case within the 'scaffolding' relationship, and often the integration is much more intricate.

In terms of the 'referent' relationship, there is comparatively less commentary on its use. Rather, the literature which discusses this kind of relationship often calls for more lecturers to adopt it over the scaffolding relationship, suggesting that it is a less common strategy for lecturers to adopt. Within this literature then, Maxwell argues for the role of the slideshow as an artefact to be commented and elaborated upon (Maxwell, 2007). In this way the *speech* would be the scaffolding within which the slideshow provides the evidence being presented. Here, the lecturer would show visual evidence for their arguments, rather than text summaries of their lecture. Alternatively, Alley and Neeley (2005) argue the case for a presentational design which includes a succinct headline, along with visual evidence for that headline. Here again the slide would be used as visual evidence of what the lecturer is saying. As shown here, this also involves more consistently and explicitly adhering to the pattern of the slide-elements, as the lecturer points out the specific elements that he is talking about as he goes through the slide.

It is important to note that this distinction in relationships, although seemingly related to the lecturers' level of integration, appears to be a different concept altogether. For instance a lecturer could follow the slide-text pattern when using their slides as some kind of referent, but equally a lecturer could follow it when using the slides as a scaffold. In the absence of data regarding lecturers' intentions, it is not

possible to make such specific claims about the individual lecturers' intentions for 'usage' of the slides. Yet it is possible that the lecturers' intentions for their speech-slide relationship are an important factor to consider. These relationships cannot be established or evaluated unless we take into account what the slides are being used for by the lecturer.

What might be most crucial, however, is to consider how these relationships are perceived by students. For instance if students thought that it was important to go through each of the elements and explain them in the style of a 'referent' relationship, and the lecturer did not, the students' experience of the lecturer would potentially be rather fraught. Confounding this matter further is the fact that relationship might not necessarily be characteristic of the entire lectures, as lecturers might adopt indicators of each type of relationship to varying extents *within* a lecture. Examining the students' experience might provide insights into whether or not consistency in integration and the lecturer's speech-slide relationship is important to the students' ability to engage with the lecture. This, along with lecturer intentions, forms the focus of the next chapter. First though, it is possible to consider what can now be said about the nature of slide-lectures as a distinct form of pedagogical communication.

4.7.1 Understanding the slide-lecture as a form of communication

This chapter has worked towards understanding how lecturers integrate slide-text into their verbal exposition to become part of the lecture performance. It outlines a categorisation scheme for the slide-elements and also for the ways in which they might be integrated into the lecture narrative. This categorisation is utilised to describe the patterns of integration of text that occur during different lectures.

That lecturers were found to vary in explicitness of integration and following the slide-text pattern signifies that the nature of slide-lecture communication is not simple. One cannot describe slide-lectures as being a simple repetition of slide-text to an audience. Rather, it seems that there are two rather different types of relationships that lecturers can have with their slide-text, and it is possible that these relationships might reflect different intentions of lecturers. This might imply some underlying conceptions that practitioners hold about the role of the slide-lecture in HE pedagogy.

In relation to the learning context of the slide-lecture, it is suggested by the present data that the student experience might sometimes be a difficult one. It is not always obvious when, and, importantly, how the text is being integrated with the speech. It seems that students are not always given clear cues as to whether the lecturer wishes for them to be looking at specific objects, or if the object is going to be giving the structure to what speech is to come next.

Consequently, some questions about the slide-lecture still remain open. Specifically, how do lecturers intend for their slide-lecture integrations to function? I.e., do they intend to use the slide in any particular and consistent way during their lecture? Secondly, does the student pick up on the way in which the slide is being used on particular occasions? Such questions are addressed in the next chapter.

Chapter 5 The impacts of the slide-lecture on teaching and learning practices

5.1 Introduction

Chapter 4 details a description of the communication practices involved in slide-lectures through a qualitative and quantitative examination of the integration of slide-text with the expository speech of slide lecturing. However, a major ambition of the present research was to consider what significance particular forms of communication might have for students' abilities to interact with lecturing components. Additionally, it aimed to examine what are the pedagogical intents behind integration practices? Chapter 4 went some way towards considering the intentions behind slide-lecture practice and considering the student experience of slide-lectures. It provided a general conception of the possible issues as a basis for beginning the second stage of data collection; namely one that explored how the lecturer might make certain choices about how to integrate their text: choices which could make the students' position in a slide-lecture potentially comfortable or difficult. Of course, the dichotomy of uses suggested does not imply a dichotomy of lecturers that either use their slides as a scaffold or as an artefact of reference. Indeed, as section 4.5.4 identified, it seems it is likely to be a mixture of both. Yet this mixture appears to place the student in a rather uncertain position, as it presumably implies that they must take different approaches to engaging with content within the same lecture. Thus the 'referent'/ 'scaffolding' distinction suggested in Chapter 4 is worth pursuing further with fresh empirical data; this time examining the perspectives of those both giving slide-lectures and those receiving them.

Chapter 5: The impacts of the slide-lecture on teaching and learning practices

This chapter utilises data collected during Phase 2 of the research which incorporates interview data from lecturers and students with observations of their lectures and lecture notes. This data is analysed to come to conclusions about the ways in which slide-lectures are used and received. The chapter begins with an outline of the existing literature relevant to the topic of study (section 5.2), before detailing the research question addressed and a description of the data used to address the question (section 5.3). A qualitative analysis then follows, considering the lecturers' perspective (section 5.4) before turning to the students' perspective (section 5.5). The findings are then discussed in relation to existing knowledge in section 5.6

5.2 Background to the analysis

The discussion of Chapter 4 intentionally did not make any judgements about the pedagogical effectiveness arising from different levels of integration of slide-text with speech. However, it did identify that some of the slide-lecture communication practices might result in difficulties for the student. For example the departure of speech from the expected slide structure, or the challengingly subtle integration of speech and text, for instance through 'mangling'. It was also suggested that different levels of integration might result from specific design intentions of the lecturers, and that this might result in different experiences for the student. It is worth again turning back to the literature in order to consider what is already known about the students' and lecturers' experiences of the slide-lecture.

5.2.1 The roles of the speech and the slide

It is expected that the differences in levels of integration found in Chapter 4 might depend on, amongst other factors, different pedagogical theories, or practice preferences among lecturers in relation to their use of slides. There are many options

open to lecturers when conducting slide-lectures and their choices might depend on personal preferences, attitudes, and beliefs about lecture pedagogy. Yet there is little research regarding why lecturers use PowerPoint at all in their classrooms and, more particularly, whether the 'referent'/ 'scaffolding' relationships are reflected in lecturers' intentions. One study which attempted to address this knowledge gap surveyed 33 lecturers at a single university, finding that the most common purpose (54%) for using PowerPoint in lectures was to 'project lecture notes, charts, definitions and explanations' (Hill et al., 2012, p. 5). Fewer lecturers (41%) used it to show richer representations (such as video) and even fewer used it for displaying questions for discussion. Interestingly, 95% of student respondents reported that, in their view, slides were used for displaying notes in the majority of their lectures. It is therefore possible that there is some discrepancy between what lecturers intend, and what students expect.

That Hill et al's study surveyed students and lecturers at a single university is a major drawback however, as it is possible that university conventions dictate what is done with slides in lectures. Yet it is possible that understandings of the role of slides are shared on a wider scale. When a lecturer uses visual materials in their lectures, it is logical for the student to assume that the visual resource is to be regarded as a form of managed communication: one to be integrated within an overall 'performance'.

It is suggested that there is an institutionalized understanding of the slides as something to which the speaker or lecturer will be referring to (Knoblauch, 2008). This might result in students coming to expect that this is what will generally happen during any given lecture. The importance of this institutionalised understanding is that, because of their expectation that such referring will happen, Adams argues that the audience might become impatient to see what will be referred to next (Adams,

2006). She suggests that such impatience renders the speech secondary to the slide and might lead to the notion that PowerPoint is where the 'real information' lies (Adams, 2006). Further, Adams argues that through this impatience to see the 'real information', students might come to the understanding that 'if it isn't on the PowerPoint it probably isn't important' (Adams, 2006, p. 398) -because it was not worthy of the powerful specification that is afforded by being included on a slide. Indeed it has already been noted that Savoy et al (2009) and Wecker (2012) have demonstrated this effect experimentally, in studies finding that retention of information given verbally during PowerPoint lectures was less than in verbal only lectures. Wecker suggested that students might selectively pay attention to the slides over speech in slide-lectures, as they might consider slides to be more important than speech. The extent to which students regard the slides as more important than the speech might be evident in their lecture study practices, such as the kind of notes they take. The next section examines what we already know about note-taking in relation to slide-lectures.

5.2.2 The role of student note-taking

As many have pointed out, the benefits of PowerPoint in lectures are mostly attributed to the facilitation of note-taking by students (e.g. Kinchin, 2006, Nouri and Shahid, 2005, Bartsch and Coburn, 2003, Shapiro et al., 2006). This facilitation is clearly important, because the way in which students take notes during the slide-lecture might have an influence on their learning outcomes. It has already been noted that note-taking can perform two functions for students; storage and encoding (Kiewra et al., 1991). Although Kiewra et al's observations were made in the 1990's (thus pre-PowerPoint ubiquity) it is possible that these functions are also relevant to functions of notes taken from today's slide-lectures. Yet it can be assumed that the

practice of providing slide handouts in advance was less common in the 1990's than today, as technologies for their dissemination were not as widely available or used. Today though, the student might bring the printed handout to the lecture, or even bring the PowerPoint document on their laptop, phone or tablet device. So the need for the student to construct free format notes throughout the lecture is removed, thus presumably negating some of the functions that they carried out pre-PowerPoint, especially encoding and storage functions. What then does the slide-lecture leave for students to do during the lecture?

In 2002, Sutherland, Badger and White studied the note-taking practices of 'new' students, that is, those comprising the cohorts of students following the advancement of widening participation initiatives in the UK. They took copies of the students' lecture notes and interviewed them after the lecture. Although there were few differences in the quality of the notes taken, they did identify some trends in what was written. For instance, some tried to write down every word that was said, and when they failed to do this reverted to writing the main points, whilst another group focussed mainly on writing the main points. What isn't clear from this study is whether the lecturer was using a PowerPoint slideshow in the lecture to show the main points, and the impact that this had on the students' ability to write down those main points. However there did seem to be access to a handout, as they reported that 5/9 of the student participants who used a handout wrote notes onto the handout (Sutherland et al., 2002, p. 385). Thus it is possible that the students' task now is to annotate the slide handouts that contain main points.

Annotating the slide is thought to be desirable from a constructivist perspective, as the students are incorporating the lecturers' materials into their own conceptual framework (Sutherland et al., 2002). However, bearing in mind Brazeau's

(2006) concerns about the reduction in the opportunity for meaningful engagement that this practice carries (see section 2.3.2.2), it is possible that annotation is not so desirable for the kind of learning encouraged here. Further, it remains to be concluded what kind of annotations are beneficial when taking notes using a handout. Seaman (2000) suggests that students should be 'organising supporting material around the main points offered in the visual display' (Seaman, 2000, p. 146) thus adding their own account of the meaning of the objects on the slide. Seaman suggests this provides an optimal level of processing; it is not too much that students become focussed solely on their notes, yet not too little that they are merely transcribing. However this conclusion is based on the presumption that students actually use the handouts for such annotation. It must be noted that what Sutherland and Badger's (2002) work doesn't tell us is what the other 4/9 students were doing with their handouts, (and potentially the PowerPoint slides) if they didn't annotate them. In other words, what do students do in response to slide-lectures if they do not annotate a slide handout?

As Clark (2008) suggests, students receiving a slide-lecture might have an 'impulsive desire to copy the notes from the screen' (Clark, 2008, p. 43). Indeed if students have not accessed the handouts, this might be a tempting practice. Raver & Maydosz (2010) suggest that this practice leads to poor learning outcomes, as identified in their study comparing learning outcomes after different handout conditions. They remarked how students without handouts tended to miss some information from lecturing speech -because they were writing down the information from the slides. This finding was thought by Raver and Maydosz to be a factor in the lower test scores in those not having access to the slides. They recommend providing partial notes prior to the lecture, and that these be used as a framework to encourage

more effective note-taking practices. Indeed, copying seems to be an entirely inefficient practice, especially if the student has access to the slides elsewhere.

However although the impulse to copy is presumably reduced when students have the notes printed off in front of them, it is by no means guaranteed that all of the students would have printed them out in advance and indeed that they would make use of them during the lecture. Grabe and Christopherson (2008), in their research on the voluntary use of online resources such as lecture outlines, found that students accessed only 61% of the information available to them, although use of online resources was positively related to exam performance. In an earlier study, the same authors found that although 82% of students printed lecture slides, only 42% actually brought them along to the lecture to annotate (Grabe, Christopherson and Douglas, 2005). It is possible that those who choose to print off the slides before the lecture might have different attitudes towards lecture note-taking than those who do not. The benefits of handouts then might differ from student to student, depending on whether or not they print out the handouts.

Nevertheless, if students are taking notes onto their slide handouts, it seems that there is an expectation that they will annotate the text which is already provided, which suggests that integration is important to such annotation. It is unclear from these studies the extent to which lecturers integrated their slide-text and whether this had any impact on students' practices. Although it seems that there are different approaches to note-taking, which may interact differently with learning outcomes, there is little understanding of the reasons for the different approaches, and whether the speech-slide relationship has an impact on the approach taken. Further it is not clear what motivations might lay in students' focus on note-taking from a particular

stream, and how this focus impacts on their learning experience and ability to engage with it.

The kinds of note-taking practices that students employ are an important factor in their slide-lecture experience. It seems crucial that the student's lecture-based engagement practices are examined in order to consider what they are doing in response to the slide-lecture, and how they feel that the lecturer's integration practices might facilitate or hamper these activities. What is also lacking from the literature is any basis for understanding the extent to which lecturers are mindful of the assumptions and practices of students, and adopt a 'referent' or 'scaffolding' style relationship based upon this. Thus the communicational intentions behind the speech-slide relationship for lecturers is an important consideration in understanding slide-lecture pedagogy. It is possible that the reported pedagogic model lecturers are pursuing may be reflected in their observed strategy for integrating. Thus the rest of this chapter outlines a study which sought to examine such issues.

5.3 Study 2: Examining the intentions for the slide-lecture experience and the extent to which these experiences are actualised.

As outlined in Chapter 3 (section 3.5), Phase 2 of the research was intended to collect not only lecture data, but also data from those giving and those receiving those lectures. A sample of 11 lecturers and 48 of their students was recruited from those teaching and studying first year undergraduate psychology during the academic year 2010/11. The data collected from study was intended to be used to address two of the three research questions, so the following sections outline which of the questions are addressed by the current chapter, and the data used to address it.

5.3.1 Research question to be addressed

The research and analysis detailed in this chapter is structured around the following question; **what experience do lecturers intend to create in the design of their slide-lectures and how far do they succeed?** It seems that addressing these questions involves an investigation of the following issues:

a. How lecturers conceptualise the slide-lecture pedagogy, and
b. How students characterise their experience of this communication genre?

In addressing these questions, it was intended that the findings from Chapter 4 relating to the slide-lecture as a form of communication could be built upon in order to understand what impacts it has on lecture pedagogy.

5.3.2 The data set

Chapter 3 (section 3.5) provided an explanation of the choice of methodological approach taken for this stage of the present research. It was reasoned that the 'measurement' of learning outcomes in different types of lecture would reveal little about the experiences arising within such learning episodes. Yet it is the experience of negotiating the slide-lecture situation that is under consideration here. Therefore, a qualitative approach was adopted: one in which these experiences were discussed with students in focus group interviews. A qualitative interview approach was also necessary for discussing the lecturers' intentions regarding the effect of their slide-lectures. The procedures for data collection employed for this stage of research are described in detail in Chapter 3 (section 3.5), but are summarised here:

- Video-recordings of lectures (section 3.5.1.2)
- Interviews with the lecturers giving these lectures (section 3.5.1.3)

- Focus group interviews with selections of students attending the lectures (section 3.5.1.4)
- Copies of students' notes from these lectures. (section 3.5.1.5)

In some cases it was not possible to carry out all of the data collection activities during the lecture visit. For instance, one lecturer was only willing to allow a video-recording to be made of their lecture but not the collection of interview data. Also it was not possible to provide carbon-copy paper at one of the lectures. Additionally, one lecturer and some student participants were unable to participate on the day owing to absence or unforeseen commitments. In total, 9 of the 11 lecturers were interviewed about their lecturing practices and reflections on their slide-lecture. Owing to timetabling issues, of the 9 lecturers, 7 were interviewed immediately after the students, 1 was interviewed before the lecture and 1 was interviewed 2 hours after the students were interviewed. As a result of this scheduling, there were no rigid plans to ask questions about specific incidents that occurred during the lecture in these interviews. In cases where the lecturer could be interviewed after the lecture and after the students were interviewed, it was possible to formulate specific questions regarding both their lecture and the student responses. Yet when the lecturer interview happened before the lecture, a set of general questions were utilised as a starting point for the interview (Appendix 3). Table 10 indicates what was included in the data captured from the lecture visits, and the number of student participants from each lecture.

Table 10: Table showing the data collected from Phase 2 lecturers

Lecturer	Field in Psychology	Topic	Lecture transcript	No. Student Focus Group participants	Lecturer interview	No. Of Student notes sets
Dr. Gray	Cognitive	Developing Understanding	✔	N/A	N/A	N/A
Dr. Wilson	Cognitive	Face Perception	✔	4	✔	N/A
Dr. Brooksbank	Developmental	Attachment/ Emotional Development	✔	4	✔	4
Professor Morledge	History of Psychology	The Newtonian Revolution and Onwards	✔	5	✔	5
Dr. Silcox	Developmental	Attachment Theory	✔	4	✔	4
Dr. Millington	Cognitive	Decision Making	✔	1	✔	6
Dr. Cullis	Developmental	Deprivation/ Attachment	✔	4	✔	4
Dr. Wren	Developmental	Cognitive Development	✔	4	N/A	3
Dr. Brindley	Cognitive	Social Cognition & Thinking	✔	5	✔	5
Dr. Bradshaw	Statistics	Correlation	✔	4	✔	4
Dr. Wormall	Developmental	Learning, Perception,	✔	2	✔	2

5.3.3 A quantitative description of the lectures

Firstly it is necessary to describe these lectures so as to determine their comparability to those lectures observed during the first stage of this research. This description includes a quantitative measure of the lecturers' speech-slide integration, based on the analytical process carried out in Chapter 4, namely through carrying out Levenshtein edit distance calculations on the observed and expected patterns of integration to establish similarity scores.

The lectures are described here in Table 11 in terms of the elements used within the slides, which are expressed as percentages of total element usage per lecturer in Table 12. Definitions of elements were based on the descriptions of elements developed in Chapter 4 (Table 2). Of particular interest is the finding that bulletpoints were again the most common type of element utilised within this sample.

Lectures are also described in Table 13 in terms of their length (based on the length of the video-recording), the number of slides used, and the amount of times the lecturer explicitly interacted with the audience by asking questions, or used an EVS to gain a response from the entire audience. Additionally the transcripts were used to describe lectures in terms of the total number of words that were spoken and how this was distributed per slide. Finally, the availability of a slide handout for students to download in advance of the lecture was noted.

Table 11 Table of the distribution of elements in Phase 2 lecturer

Type of element	Subtype	Polysemic or monosemic?	Dr. Brooksbonk	Dr. Gray	Dr. Silcox	Dr. Cullis	Dr. Wilson	Dr. Wormall	Dr. Bradshaw	Professor Morledge	Dr. Millington	Dr. Wren	Dr. Brindley	Total
			Frequency of element											
Scriptural	Bulletpoints	Monosemic	78	89	166	110	106	90	118	75	119	129	49	1129
Scriptural	Structural Text	Monosemic	11	30	24	24	32	32	45	1	22	32	19	272
Scriptural	Quote	Monosemic	0	0	2	1	0	0	0	0	1	2	0	6
Graphical	Graphs	Monosemic	0	0	0	0	0	0	12	0	3	3	1	19
Graphical	Diagrams	Monosemic	0	0	0	0	5	1	0	3	1	0	4	14
Figurative	Photographs	Polysemic	5	7	2	3	24	6	0	5	2	12	20	86
Figurative	Images	Polysemic	1	4	0	4	3	19	7	5	2	3	0	48
Numerical	Pure numerical	Monosemic	0	0	1	0	0	0	5	0	0	0	3	9
Numerical	Textual numerical	Monosemic	0	3	0	1	0	1	0	0	0	1	0	6
Numerical	Mixed	Monosemic	0	0	0	0	0	0	2	0	0	0	0	2
Dynamic	Video	Polysemic	0	6	2	1	0	0	0	0	0	0	1	10
Dynamic	Dynamic Diagram	Monosemic	0	0	0	0	0	0	0	0	0	0	0	0
Resource	Web resource	Monosemic	0	0	3	0	0	0	0	0	0	0	0	3

Table 12 Table showing the presence of elements as a percentage of total element usage in Phase 2 lecturers

Type of element	Subtype	Polysemic or monosemic?	Dr. Brooksbonk	Dr. Gray	Dr. Silcox	Dr. Cullis	Dr. Wilson	Dr. Wormall	Dr. Bradshaw	Professor Morledge	Dr. Millington	Dr. Wren	Dr. Brindley
			% of element use										
Scriptural	Bulletpoints	Monosemic	82.11	64.03	83.00	76.39	62.35	60.40	62.43	84.27	79.33	70.88	50.52
Scriptural	Structural Text	Monosemic	11.58	21.58	12.00	16.67	18.82	21.48	23.81	1.12	14.67	17.58	19.59
Scriptural	Quote	Monosemic	0.00	0.00	1.00	0.69	0.00	0.00	0.00	0.00	0.67	1.10	0.00
Graphical	Graphs	Monosemic	0.00	0.00	0.00	0.00	0.00	0.00	6.35	0.00	2.00	1.65	1.03
Graphical	Diagrams	Monosemic	0.00	0.00	0.00	0.00	2.94	0.67	0.00	3.37	0.67	0.00	4.12
Figurative	Photographs	Polysemic	5.26	5.04	1.00	2.08	14.12	4.03	0.00	5.62	1.33	6.59	20.62
Figurative	Images	Polysemic	1.05	2.88	0.00	2.78	1.76	12.75	3.70	5.62	1.33	1.65	0.00
Numerical	Pure numerical	Monosemic	0.00	0.00	0.50	0.00	0.00	0.00	2.65	0.00	0.00	0.00	3.09
Numerical	Textual numerical	Monosemic	0.00	2.16	0.00	0.69	0.00	0.67	0.00	0.00	0.00	0.55	0.00
Numerical	Mixed	Monosemic	0.00	0.00	0.00	0.00	0.00	0.00	1.06	0.00	0.00	0.00	0.00
Dynamic	Video	Polysemic	0.00	4.32	1.00	0.69	0.00	0.00	0.00	0.00	0.00	0.00	1.03
Dynamic	Dynamic Diagram	Monosemic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Resource	Web resource	Monosemic	0.00	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 13: Table describing the Phase 2 lectures

Lecturer	Length of Lecture (Min:sec)	No. of Slides	Number of interactions with the audience	Average no. of words spoken per slide	Animation	Use of EVS	Provision of Slide Handout in Advance
Dr. Brooksbank[10]	15:30	10	0	272.30	None	0	✔
Dr. Gray	44:29	28	14	206.64	Partial[11]	0	✔
Dr. Silcox	48:20	27	0	290.00	None	0	✔
Dr. Cullis	46:10	24	2	299.29	None	0	✔
Dr. Wilson	45:16	52	3	115.25	None	0	✔
Dr. Wormall	46:20	32	1	256.91	Yes	0	✔
Dr. Bradshaw	49:17	48	9	169.63	None	0	✔
Professor Morledge	46:21	16	4	431.50	Partial	0	✔
Dr. Millington	34:55	24	2	208.67	Yes	0	✔
Dr. Wren	55:06	29	6	271.76	None	0	✔
Dr. Brindley	50:36	18	9	378.50	Partial	0	✔

5.3.3.1 Integration scores

The same coding and Levenshtein edit distance process employed in Chapter 4, (section 4.5.2.2) was again employed here to examine differences in the way that the lecturers approached their speech-slide integration. The mean integration score for each lecturer is displayed in Table 14 in ascending order.

[10] Owing to technical issues, only the first 15:30 minutes of this lecture were captured in the video, although the lecture went on for around 45 minutes

[11] Partial animation refers to the way in which lecturers animated some elements but not others

Table 14: Table of mean integration scores for Phase 2 lecturers

Lecturer	Mean Similarity Score	Std. Dev. Similarity
Dr. Millington	0.64	0.11
Dr. Wren	0.64	0.15
Dr. Gray	0.66	0.15
Dr. Bradshaw	0.75	0.19
Dr. Wilson	0.76	0.21
Dr. Silcox	0.78	0.15
Dr. Brindley	0.79	0.20
Dr. Brooksbank	0.80	0.10
Professor Morledge	0.80	0.15
Dr. Wormall	0.84	0.17
Dr. Cullis	0.86	0.13

A one way ANOVA was used to test for differences between the lecturers in the extent to which their observed patterns matched their expected patterns using the individual slides as the population and lecturer as the factor. The differences between lecturers in the similarity of their speech to their slides was again found to be significant $F(10, 272) = 4.096$, $p = <0.001$. It seems that the Phase 2 lecturers also differed significantly from each other in their adherence of their observed speech-slide integration pattern to their expected slide patterns.

Owing to the chapter's focus on examining the experiences that lecturers intend to create in the design of their slide-lectures and the extent to which this experience is realised, a qualitative analysis of interview data from lecturers (section 5.4.1) and students (section 5.5) was carried out. The collection of students' notes afforded a quantitative content analysis of the information students took from slide-lectures in note format (see section 5.5.1).The next section then begins the analysis with a consideration of the lecturers' conceptions behind the slide-lecture experience.

5.4 The experiences lecturers intend for their slide-lectures

Lecturer interviews were subjected to a data driven thematic analysis. The process for this was guided by Miles and Huberman's (1994) outline of the sequence

of stages in a qualitative analytical process (cited in Mertens, 1998). This process involved first coding the data based on general topics of discussion and reflecting on these codes to identify similar codes, or relationships between codes. Then the patterns are elaborated to describe consistencies in the data, before relating the patterns to a formalised construct. Thus an initial coding process identified themes of interest, an examination of these topics revealed patterns between themes and, then, a consideration of these patterns in the light of the existing knowledge revealed those issues which are presented in the analysis. This was completed using NVivo 9 to track the coding through the large quantity of data collected. This gave rise to some interesting insights into the context of lecturing and of the slide-lecture pedagogy according to these lecturers.

5.4.1 How do lecturers conceptualise the slide-lecture pedagogy?

The context within which slide-lectures were given was examined through identifying the lecturers' perceptions of the roles of the three players in the slide-lecture performance triad (the lecturer, the slides, and the audience). These are depicted visually along with frequencies in Figure 15 below, before detail is given regarding the roles as discussed by the lecturers.

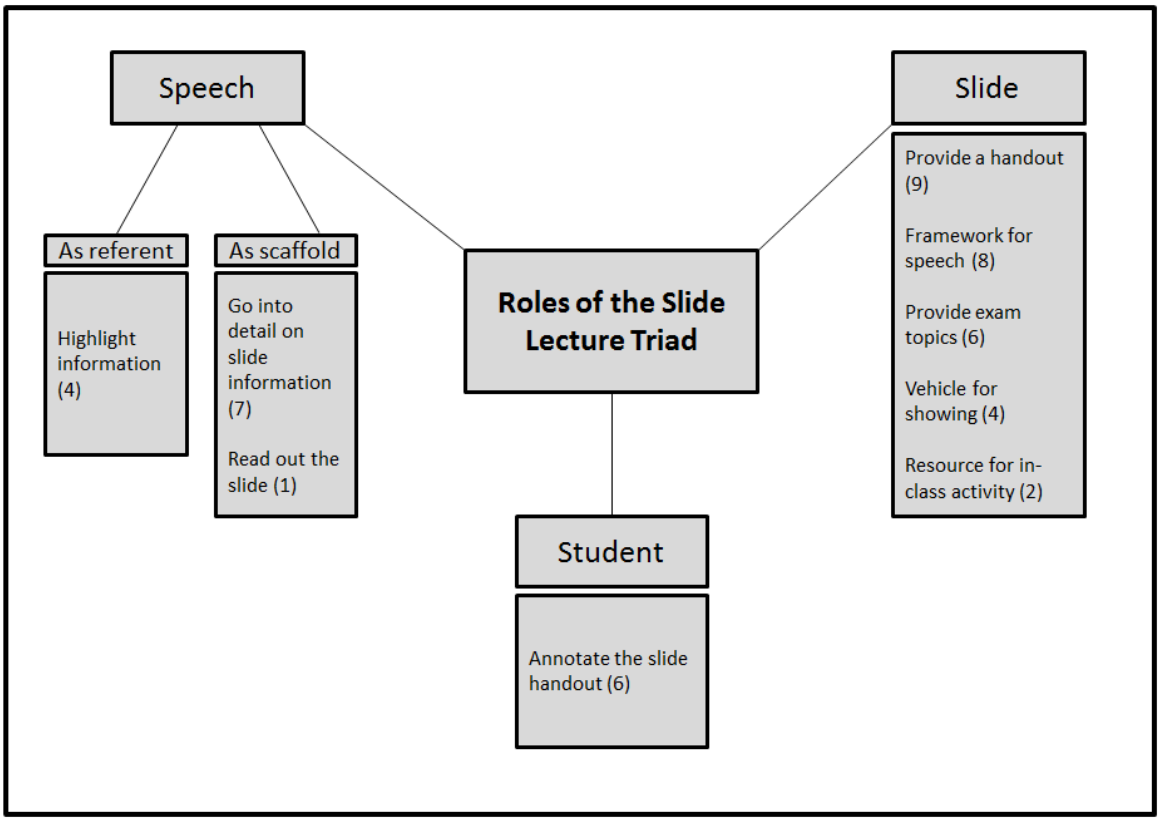


Figure 15 Roles of the slide-lecture triad as identified by lecturers

5.4.1.1 Roles of the slide and speech in slide-lectures

Here the data are organised around three key themes of interest which were led by the research questions for this chapter. The responses relating to the role of the slides for lecturers will be discussed before considering the role of the lecturers' speech in terms of the speech practices which are related to the different types of relationship with the slide.

The role of slides in a slide-lecture

Of particular interest was the tendency for lecturers to talk about the role of slides in terms of the handout that could be produced by the PowerPoint file. In fact in all of the lecturer interviews, the lecturers spoke about the slides and the handouts as

synonymous objects at least once. For instance, when asked why Dr. Wormall used slides in her lectures, she responded:

> I use PowerPoint for the sake of the students having notes in front of them; I always make them available in advance. Because I think it's pretty horrific to try and make notes on everything you're being told without having some sort of a skeleton in front of you to make notes on. (Dr. Wormall)

Professor Morledge reflected this view:

> Well it's there on Blackboard[12] as a structure for their notes. (Professor Morledge)

This pre-prepared record was generally spoken about in terms of its use for students' exam revision. Indeed 6 of the 9 lecturers made explicit references to their use of slides as a means to provide students with an outline of key points to read about and to revise for the exam, or as a resource for use outside of the lecture:

> The way that I've tried to pitch this particular part of the course, technically everything they will need to know is on the slides. (Dr. Wormall)

And

> The lecture slides have to guide [the students]; I have to teach towards the exam. (Dr. Wilson)

---

[12] The University's VLE

The lecturer teaching a statistical subject used her slides as a means to provide students with instructions for carrying out statistical tests:

> They're step by step guides for the students on how to do the tests once they get into the lab. (Dr. Bradshaw)

All of the lecturers commented that one of the roles of the slides was as a pre-prepared record of the lecture for their students. The first observation then is that largely the primary role of the slides is to provide students with a handout for the lecture.

Of course such responses were probed further in order to understand how the slides were being used *during the lecture itself*. When asked what they used their slides for during the lecture then, responses fell into themes, two of which are illustrated by the following response where the lecturer describes a scenario in which the slide functions as a framework for her speech, or as a 'script' to remind her to talk about things that might appear on the exam, and as an overview for her students:

> **I use it as a framework, so I know where I am and what I'm trying to talk about**, and I use it so [the students] know where I am and where I'm going with it and I just think it's a really effective kind of tool. I try not to put too many words on it and I use it as a prompt, so that you can, **they can get an overview just from looking at it** and then I try to talk around the points. What I find with this module, because of the way it's examined so because of the multiple choice exam, there are specific points that I have to get across; because I know that

> they're in the exam. If you see what I mean so in order to make it fair to the students so that they've covered this topic, there are certain things that I need, so **I will then use my PowerPoint as a bit of a kind of almost, not a script, because then it's on the slide and I know I need to cover this study or critique of Bowlby's hypothesis or whatever it might be because it links to the exam questions.** (Dr. Cullis)

Indeed the other lecturers cited these two main functions to varying extents in their interviews. Indeed in describing the slides as synonymous with a handout, all of the interviewed lecturers identified the role of the slides as an outline for students. Further, 8 of the 9 cited that their slides performed as a prompt for their speech, for instance:

> Well part of it is I don't have any notes and I just use it as my prompts for talking. (Dr. Brooksbank)

Again this might be linked to exam revision, as the following lecturer highlights:

> So the things on the PowerPoint are the things that I actually must remember to tell them, whatever else I say, I've got to tell them these things. (Dr. Bradshaw)

However, another relatively common function for the slides was as a means to show things, as 4 for the 9 lecturers cited this use of slides, for instance:

> Just a means of showing things. Regardless of whether it's just for fun, or educational purposes, it's just a means to an end. (Dr. Wilson)

And

> I'm generally using it as a vehicle for images. (Professor Morledge)

However, there were some further uses which were less frequently cited, for instance two of the lecturers used their slides in order to promote activity and engagement within their students, in that the handouts that were provided to students contained gaps in the text, referred to as a 'gapped handout'. The slides and speech then provided the missing information to these gaps, which the students could note thus keeping them engaged during the lecture:

> As part of my teacher training one of the people from the teaching centre said 'ooh it could be a good way to help, to kind of keep student engagement' so to stop them getting into the routine of thinking I've got the slides in front of me and I'll just listen to what she's saying and kind of switching off almost, if they've got to put the gaps in. (Dr. Cullis)

Yet it seems this lecturers' use of slides was also aimed at providing an outline for her speech (and for students), albeit in a potentially more active way.

Overwhelmingly, it seems that the slide's role in the lecture was predominantly conceived of as a means to provide a handout containing an outline of

what will be covered in the lecture, for the purpose of guiding the speech, outlining for students what needs to be revised and, finally, for showing things to students.

A large feature of the slide's role is the relationship that the lecturer has with it when in use. As mentioned previously, the relationship might take two different forms: that of using the slide as a scaffold for the lecture, and as an expository reference to slide-elements. These seem to be apparent in the two usages of slide in which lecturers mentioned using slides as a script, or using them as a 'vehicle' for images. When compared against the 'referent'/ 'scaffolding' relationships identified in the literature and in Chapter 4, then, the use of slides as a script might imply a 'scaffolding' relationship whereas the 'vehicle' to show things might imply a 'referent' relationship. Yet the distinction was clearer when lecturers talked about the roles of their speech. The themes describing the role of the speech are thus separated between the two relationships.

Using the slides as scaffolding for the lecture

The 'scaffolding' type of relationship, as described in Chapter 4, makes reference to the way that lectures might use their speech as a means combine the messages in the text outline with the messages in their speech. When talking about the role of their speech that accompanies the slide, the overriding theme that could be attributed to the 'scaffolding' relationship was that the speech serves to go into detail on the topics outlined by the slides. Indeed 7 of the 9 lecturers described this as a role of their speech:

> I try to talk around what's, I try to give a bit more detail on something. That isn't literally written down. (Dr. Brooksbank)

This ‘going into detail’ consisted of various practices, for instance elaborating, expanding, giving extra information such as details of a study, or:

> Using examples that aren’t on the slides, it’s a bit like extending the analogy. (Dr. Millington)

What seems interesting is that lecturers, in describing this usage, seemed to suggest that all of the information that students needed was not included on the slides, and that the speech was reserved for adding to it, as Dr. Bradshaw highlights below:

> What I do is I put in the things that I know that I need to cover, and then will go back and think, well that doesn’t make sense on its own so they need a bit of context here. (Dr. Bradshaw)

Here her speech practices were focussed around considering what was missing from the slide. Thus when using the slides as a ‘scaffold’, it seems that the lecturers typically considered the role of their speech to somehow make sense of what is on the slide through providing more information than what appears on the slide. However, other roles of the speech-slide relationship which emerged could more easily be attributed to the referent relationship.

Referring to the slides in the lecture

In the referent relationship, the lecturer is thought to be talking about particular items on the slide. Consulting the lecturer interviews, 5 of the lecturers did appear to describe this kind of relationship. When asked about what the lecturer does with their speech in relation to the slide, one informant noted that it performed the function of highlighting the importance of the information and linking the information:

> All of the information they need may be on the slides, but I tell them verbally 'the important thing you need to know is this', or 'this is particularly important because of all the dependencies we talked about 5 minutes ago', and it's sort of, I will highlight to them where the causes and relationships and the important bits lie by what I'm saying. (Dr. Wormall)

When asked about a specific instance in her lecture, in which she said she had been highlighting the key information, Dr. Bradshaw used her speech to explicitly instruct students to make a note of the information:

> I emphasized it particularly that it is important. And I think I probably said to them 'highlight it', or 'if this is the only thing you write down', and, so it is on the slides, but I don't think it shows if you're just reading the slide flat, I don't think it says 'this is a key point'. That becomes part of the [speech], that it's a key point. (Dr. Bradshaw)

For another lecturer the integration performs the function of directing the students' attention to the right element at the right time, elaborating on it, or simply telling students what the element is, as illustrated in this quote:

> I would rarely have something on a slide and not direct the audience to it. I occasionally say 'look there's some data here don't worry about that for the moment, my point is this' and I'll draw them to something, and I'll say 'you can have a look at that

> later', but usually what I do is I talk about the stuff that's actually on that slide. (Dr. Silcox)

And finally another lecturer used his speech to provide structure to his slides, again suggesting that the function of the speech might be to direct the students' attention to the element in question:

> Sometimes to enable me to point to elements of [the slide] which gives a certain amount of structure. (Professor Morledge)

Thus it seems that fewer lecturers described the 'referent' relationship when talking about their speech-slide interactions. Of those that did, the function was to highlight information, link information to prior learning, directing students' attention to the right element, and for labelling the element.

Reading out the information from the slide was aligned with this relationship in Chapter 4, but not strongly by the lecturers. It was interesting to note that only one of the lecturers identified the role of the speech as a means to read out the slide, but in this case it was because he was carrying out an experiment with his students:

> Sometimes you have to read them though, so base rate neglect problems, they need to be read out because they are the experimental materials. (Dr. Millington)

Here, the lecturer admits that reading out is sometimes needed where the slides are being used for something *other than* a text outline of the lecture. He was using the slide to display an example of materials, and as such was using it as a

'referent' in this case. Yet in the main part, there was a general rejection of such a practice:

> Because it's boring for them to just, for me to read off, and I've had that criticism, it always annoys me because I try not to do it. But I understand why, because it is boring. You know if you're just going to read me the slides, I might as well just have the slides right? (Dr. Silcox).

Overall then, the roles of the speech identified by the lecturers do tend to correlate with the two different types of speech-slide relationship proposed. Yet the most commonly described relationship was the 'scaffolding' relationship. What should be noted though, is that the 5 lecturers who described the 'referent' relationship also talked about their use of the 'scaffolding' relationship. Thus the notion that lecturers might display both relationships with their slides throughout the lecture can be endorsed.

In discussing their use of slides, lecturers tended to focus their explanations around what they believed it did for the students. Thus it is important to examine what they think students should be doing in response to their relationship with the slides.

5.4.1.2 Role of the student in the slide-lecture

The lecturers were asked what they want their students to be doing with the slides during the lecture, which would reveal what they consider to be the students' role in the slide-lecture triad. Some general lecture activities were suggested for students, such as interacting with the lecturer, thinking about the information and thinking critically. However these were considered to be activities which would be

expected of lectures in general and not specifically relevant to how lecturers expected their students to be interacting with the slide-lecture specifically.

In relation to slide-lectures specifically then, there was a general acceptance that students should be annotating their slide handouts, by identifying 'key points' from the speech to process into summaries on their handouts. Indeed 6 of the 9 lecturers cited this activity in response to the question. Thus the student's role is to identify what is not on the slide already and supplement the handout accordingly:

> For me it's about them annotating [the slides] as a basis for their revision…more importantly, how they've made it their own, by annotating it. (Dr. Brooksbank)

In order to help students do this annotation, all of the lecturers provided access to the slides in their entirety, or almost entirety, prior to the lecture via a VLE or through providing a printed handout at the lecture. In 2 cases, the slides provided to students differed slightly to the ones displayed during the lecture. For instance, one lecturer was concerned with copyright issues, and so removed any unreferenced multimedia from slides made available to students. Another intended to perform activities during the lecture, such as illusions and experiments, which required that students had not seen the material previously, so this information was omitted from the students' version of the slides.

Of those who did not specify that students should be annotating their handouts, the suggestion was that they should be taking notes as a general practice:

> I'd rather they took notes. I expect them, and I told them this at the beginning, they should take them. (Dr. Silcox)

One designed her slides so that students would have to take notes from what she was saying specifically by using few words on her slides:

> The idea was that because they're, the words are taken off of the PowerPoint; they have to listen to what I'm saying to get the information. (Dr. Brindley)

That students are expected to take notes implies that they are given the responsibility to identify what they think is the important information to note down; in addition to the basic information they have already been given. Yet this also implies that lecturers to some extent deliberately omit information from the slide in order to let students decide whether or not to write it down. Here, Dr. Cullis describes some 'obvious' instances in which note-taking would be expected:

> I kind of expect that they will be scribbling things down, and not my every word, but you know there are times where it seems to me it's very obvious that this would be a good thing to note down. (Dr. Cullis)

So the student is expected to identify these 'obvious' instances, perhaps through identifying the lecturer's relationship with the slide, in order to note down what was said about the slide information. The general consensus then is that the student's role in a slide-lecture is to identify what is missing from the slide. Crucially the expectation is that in annotating the slide or in taking notes in general, it is assumed that the notes will predominantly represent information appearing in the speech.

For lecturers then, it seems that the motivations for the use of slide-lectures focussed around the provision of a handout of the outline of the lecture. In providing this, their students are able to annotate or to revise from the handout. The speech-slide relationship serves to either go through the outline, or to talk about items on the outline, and thus identify information that might be noted down by the student. I now turn to an examination of the student data to consider whether lecturer intentions are matched by the student experience.

5.5 The student experience of the slide-lecture

The previous section has set the scene for analysis of the student experience by considering the intentions that the lecturers have for this experience, which are mostly aimed towards aiding their students' note-taking processes. The next sections consider the students' experience in relation to receiving this speech-mediated text outline of the lecture, and the extent to which students' recognise their lecturer's motivations. Given the lecturers' focus on note-taking, it seemed constructive to first examine students' note-taking practices, to see if they match lecturers' expectations for annotation.

5.5.1 Students' note-taking practices.

To examine the extent to which annotation is performed by students in a slide-lecture, the 37 copies of students' notes were examined. The first observation that was made about the notes was that their format seemed to differ, for instance in some cases the notes were clustered around the shape of a slide handout with large gaps indicating the location of the slides, such as in Figure 16. This student was clearly annotating a handout.

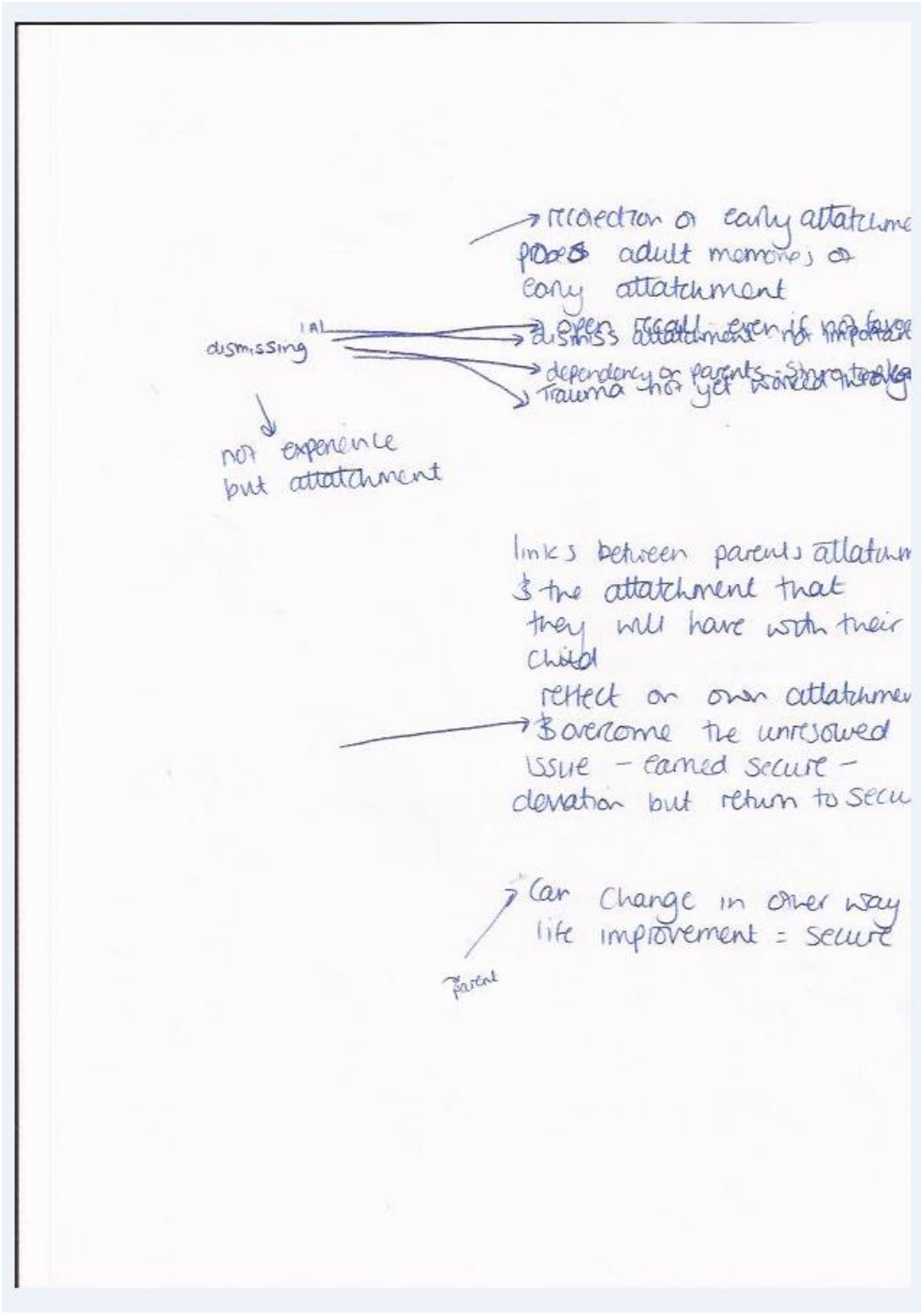


Figure 16: Example of an annotated slide handout

On the other hand, where the notes follow a lined structure such as in Figure 17 the student was clearly making their notes independently of the handout.

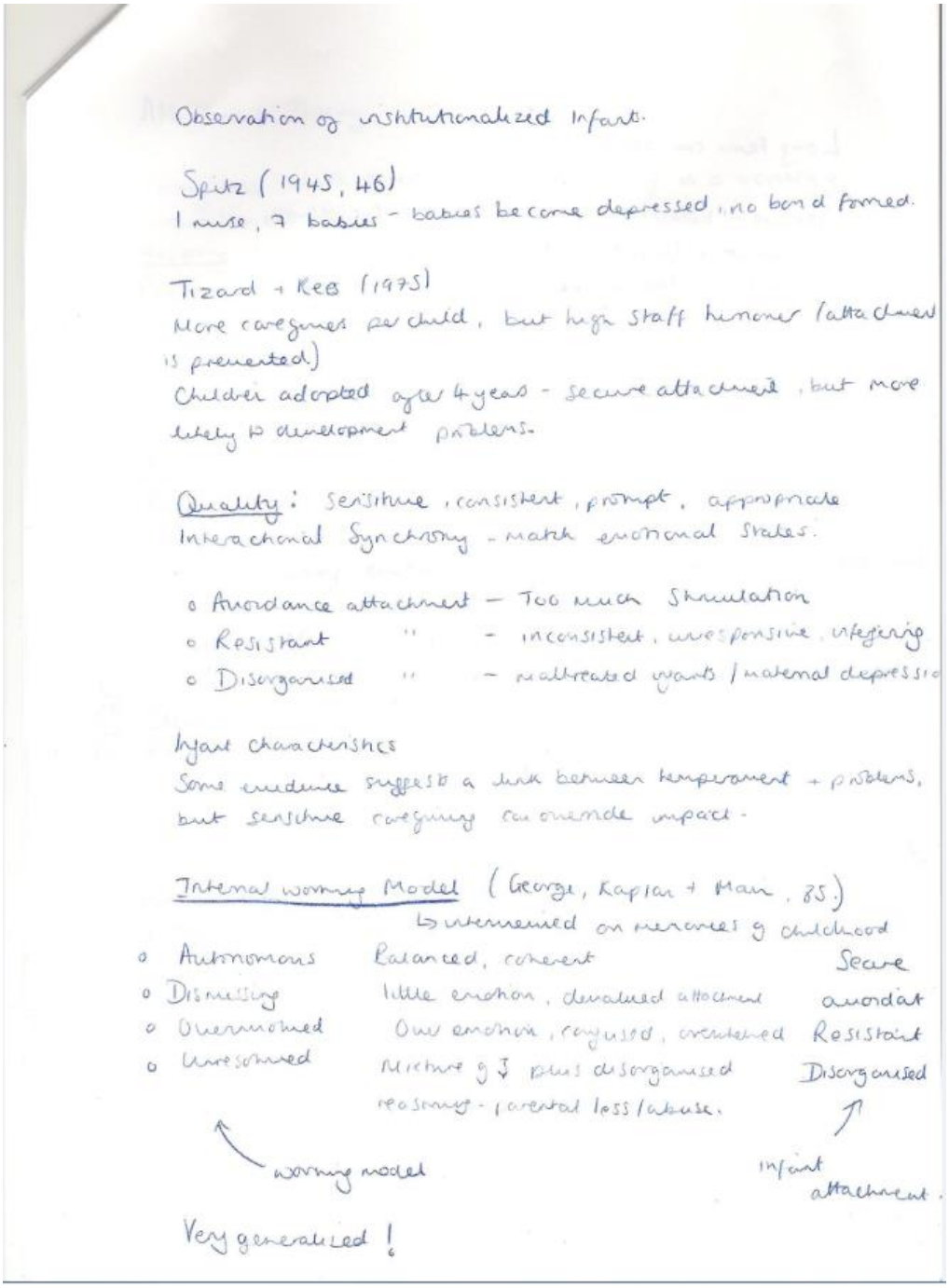


Figure 17: Example of notes taken independently of the slide handout

Thus where the structure of notes was spaced around blank spaces indicating one of the typical handout templates provided by PowerPoint (e.g. 6 slides to a page, or 3 slides with allocated space for note-taking), these notes were considered as annotations of a handout. Alternatively, where notes followed a lined structure, with

no blank spaces to indicate a template structure, the notes were considered to be taken independently of a handout.

An examination of each page of notes using these categories identified that there were two approaches to note-taking within the students; those who annotated the slide handout during the lecture and those who did not. Students were almost equally divided into these two groups, with 46% using slides for annotation and 54% who made notes independently. The first observation then was that not all students conformed to their lecturer's expectation that students will annotate the slides. Table 15 shows the breakdown of student note-taking practices by lecturer, based on whether the students took their notes directly onto the PowerPoint handout, or whether they took notes freely onto their notebooks, or 'independent notes'.

Table 15: Table showing the distribution of note-taking practices

Lecturer	Sets of notes taken directly onto slide handouts	Sets of Independent notes
Dr. Brooksbank	1	3
Dr. Silcox	3	1
Dr. Cullis	3	1
Dr. Wilson	N/A	N/A
Dr. Wormall	1	1
Dr. Bradshaw	5	0
Professor Morledge	0	5
Dr. Millington	4	1
Dr. Wren	0	4
Dr. Brindley	0	4
Total	**17**	**20**
%	**46**	**54**

Table 13 (p. 186) showed that all of the lecturers provided access to the slides prior to the lecture. Thus although all of these students had access, some evidently chose not to use the slides for note-taking (although this does not necessarily mean that they didn't print them out at all, or intend to in the future). It is noted that for

some of the lecturers, the participating students all employed the same practice, for instance all of Dr. Wren's students took independent notes, even though the slide handouts were available. However, it was considered that the sample sizes were too small to assume that the same could be said for all students in the class.

Thus there were two different practices of note-taking, regardless of the 'annotation' intentions of the lecturer. It seemed important to consider the students' reasoning behind these note-taking practices. The interview data was consulted for this consideration, this time looking specifically for references to the motivations behind their note-taking practice.

5.5.1.1 I annotate the slide because…

Students who spoke about annotating their slide handouts gave pragmatic reasons for doing so, for instance that the slide already contains all of the useful information that they need:

> Everything you need to know is just right, is already on [the handout] which is why I haven't written much. (Student of Dr. Brooksbank)

The student can therefore simply take home the handout, or can personalise the handout through making notes, and importantly take this home to be referred to again, as highlighted by the quote below:

> I always take [handouts], because they're what I keep, so I write notes on those and then I put them in my folder. (Student of Dr. Bradshaw)

In doing so, the student might consider that their understanding would be improved by annotating the slide handout, as the below student argues:

> When I print slides off, I would, I'd write the extra things that he said to explain it better, so you have a better understanding. (Student of Dr. Wilson)

This student went on to explain that she felt this was a beneficial approach as it left her attention available to listen to the lecturer instead of spending time and attention on writing. In this way, annotating the slides using information from the lecturers' speech is understood to help build a more thorough understanding of the text on the slide. Thus for those who used it, the handout is considered as a replacement for the students' own note-taking process, which just needs to be supplemented or personalised with relevant information from the speech. Crucially though, it leaves their attention free to focus more on the information from the speech.

5.5.1.2 I write my own notes because…

Those who spoke about writing out their own notes, without using the handout, cited more cognitive reasons for doing so:

> I find I take more in when I write it down rather than when I just, if I have the slides I don't actually take it in, but when I actually physically write it, I find I take it in more. (Student of Professor Morledge)

This student clearly felt that the physical act of writing notes facilitated her learning processes during the lecture. This seems like an important issue, as presumably those who use the slide handout are missing out on this process.

However, another student who used the same reasoning highlighted that the practice might not be so useful after all:

> Interviewer: You said you usually just take notes without the handout, what sort of things do you do, what things do you write down?
>
> Student 3: Nearly all of the slides. And I find that helps more, because when you've got it just printed out in front of you, it doesn't go in my head. Because it's just written down for me. So I find it better just writing all the slides out during the lecture. (Student of Dr. Wren)

For this student, her task for the lecture was to write out the text that appeared on the slides. The student regards this as an effective learning process, as at least by writing it, it is 'going in'. However, this practice is questionable as one might expect that since students know that the slides are available on their course VLE, they might avoid this copying in favour of focusing on the lecturer's speech. The student has access to the slides, so could carry out this copying at any time, and that she chose to do so during the lecture is curious. Further as the below student notes, writing down the slide-text distracts her attention from the lecturers' speech, so the explanation for the text might be missed:

> See I can't remember what he was saying, because I wrote exactly, because I transcribed what he wrote down there. (Student of Dr. Wren)

Yet this practice might be explained by the following quote:

> That's why I started doing it as [independent] notes as well because even when I did have the slides there I didn't look at them, I just kind of wrote them next to the slide that she was on and didn't read the slides at all. (Student of Dr. Cullis)

The student was concerned that she was ignoring the text on the slide when using a handout, so changed her note-taking practices to allow her to devote more attention to the slide-text. Presumably these students regard the slide-text as an important part of the lecture and that ignoring it is detrimental to their learning. The following quote further highlights the problem with the approach:

> When I first started Uni, I used to write loads and loads of notes, and then I typed them up over the Christmas holidays as, extra, part of my revision I typed them up. But then, the later in the semester it got, I got to just printing the lecture slides off and making notes on them, because to start with I found that I was so busy making notes, I wrote pages and pages of notes, that I was missing what they were saying. (Student of Dr. Wren)

Here, the student might have been talking about making 'loads and loads' of notes on the lecture as a whole (meaning from both slide and speech streams). However the fact that she admitted that printing off the slides and taking notes onto them alleviated the problem of her missing what the lecturer was saying suggests that she was focusing on writing down the slide-text. For this reason she changed her note-taking practice to avoid doing so.

It is possible that the two approaches might be motivated by differing attitudes towards the importance of the speech and slide streams; those who see the speech as important might print out the slides in order to devote their attention to the speech. On the other hand students who consider the slide-text important might focus on capturing it with their notes. Yet the provision of slides and their associated handouts was generally intended by the lecturers as a means of freeing up students' attention. It would be assumed that this would allow students the cognitive space to consider not only things that they found interesting in the lecturer's speech, but also original observations about the lecture material. Thus it is important to examine the extent to which students really do copy out the slide-text, or whether there is room for students to record any of the lecturers' speech, or even thoughts of their own in relation to the material. The copied notes were therefore subjected to a content analysis in reference to the lecture transcript, in order to identify the apparent origin of what was noted.

5.5.1 Student note-taking practices

Through carrying out a content analysis comparing the content of the notes with the lecture transcript, the notes were categorised according to whether they appeared to have originated from the slides' text or whether the students were noting something that the lecturer had said which did not appear on the slide-text. In order to do so, notes were separated into 'chunks' rather than examining whole pages of notes. This way, each distinct note that the student made could be categorised according to its origin. A chunk of notes was considered to be words and visual information which were spatially distinct within the page of notes, for instance a label with an arrow, or a complete sentence or paragraph. Thus spatial cues used by the students were employed to separate notes into distinct chunks. Figure 18 below is an example of a

selection of notes where a space or bulletpoint separates sentences or individual words. These notes were separated using these spatial cues.

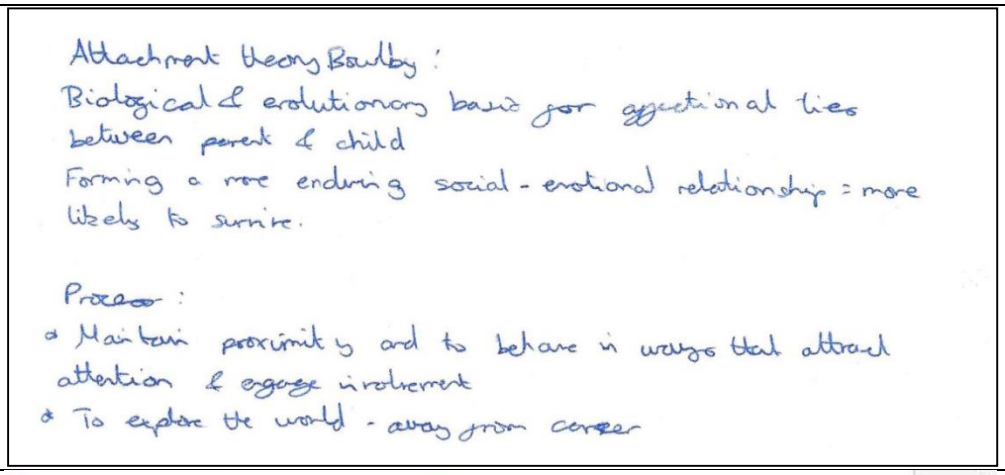
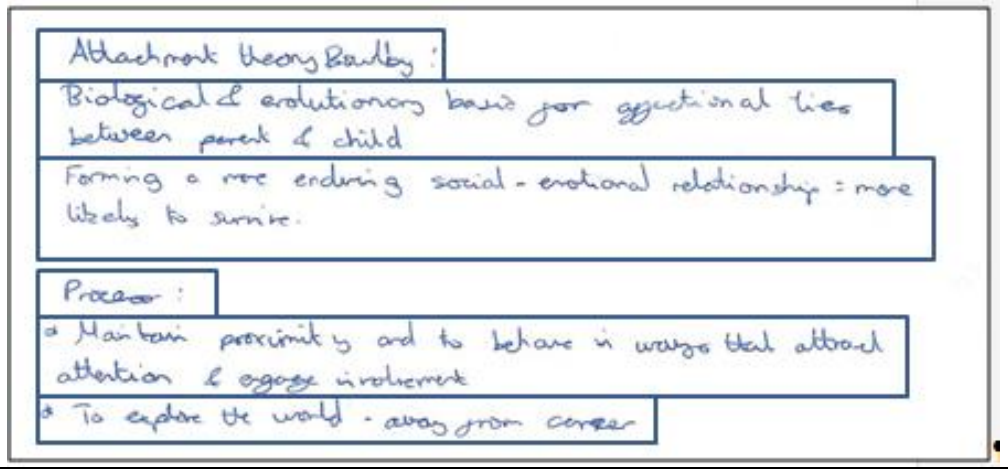
Notes	
Notes separated into chunks	

Figure 18 Example of notes separated into 'chunks' for analysis using spatial cues and bulletpointing

Similarly, the students' use of labels and arrows were employed to indicate a distinct chunk of notes, for example in Figure 19 below:

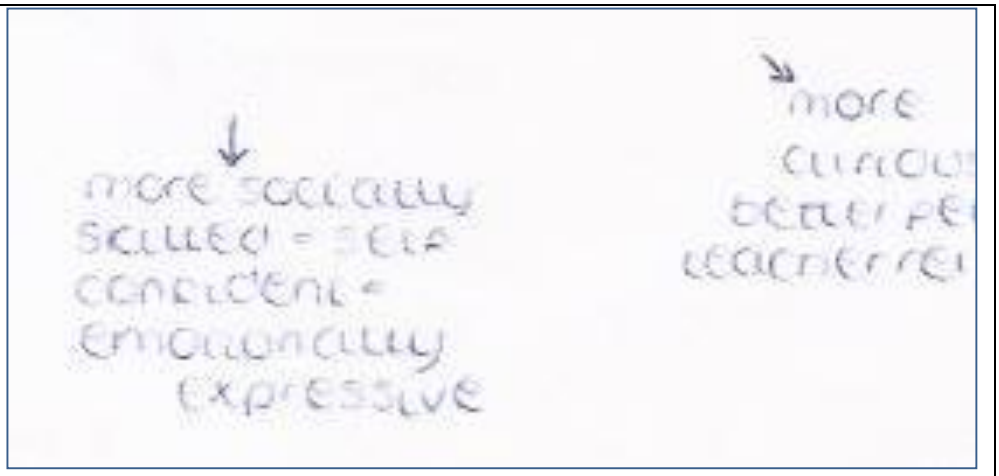
Notes	
Notes separated into chunks	

Figure 19 Example of notes separated for analysis by the use of arrows

Thus where a collection of sentences or words had been connected by students through the use of arrows or lines, these were considered to be combined into a distinct chunk of notes. However, where a bracket had been used to interject additional information relating to a collection of notes, these were not considered to be indicators used by students to group the notes together, rather they were considered as devices to add another chunk. Figure 20 provides an example of this addition.

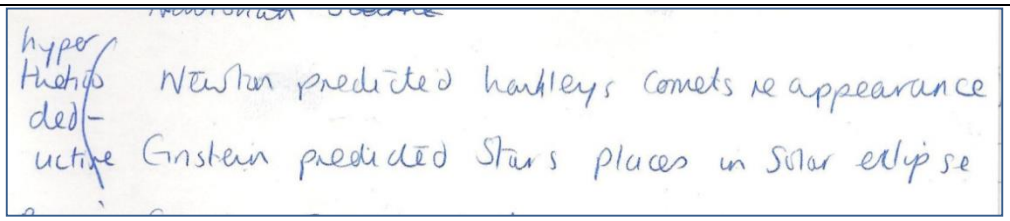
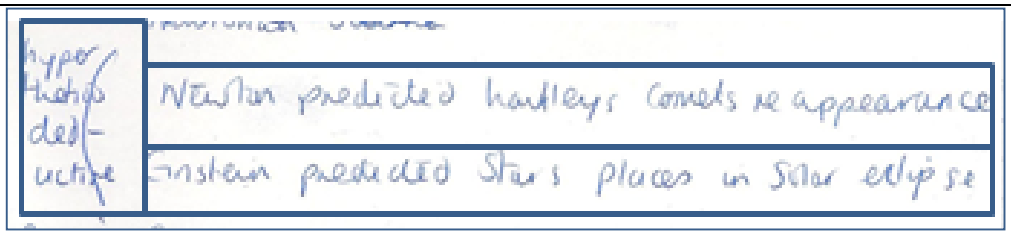
Notes	
Notes separated into chunks	

Figure 20 Example of the use of brackets to indicate addition of a chunk of notes

Where the chunk of notes could be semantically linked to text appearing on the slide but not to the speech then, it was categorised as having originated from the slide-text. Figure 24 (p. 217) is an example of such a note. Alternately where the note could be semantically linked to information appearing in the speech (identified using the same speech-text integration procedures described in section 4.5) but not the slide, it was categorised as having originated from the speech. Figure 21 displays an example of this type of note, where it can be seen that the information contained in the note does not appear in the slide, yet does appear in the lecturers' speech. Although the word 'Eclipse' does appear in both speech and slide, the lecturer was referring to 'eclipses' in general whereas the slide refers to 'Einstein's eclipse' specifically, so this cannot be considered to be a link with the note.

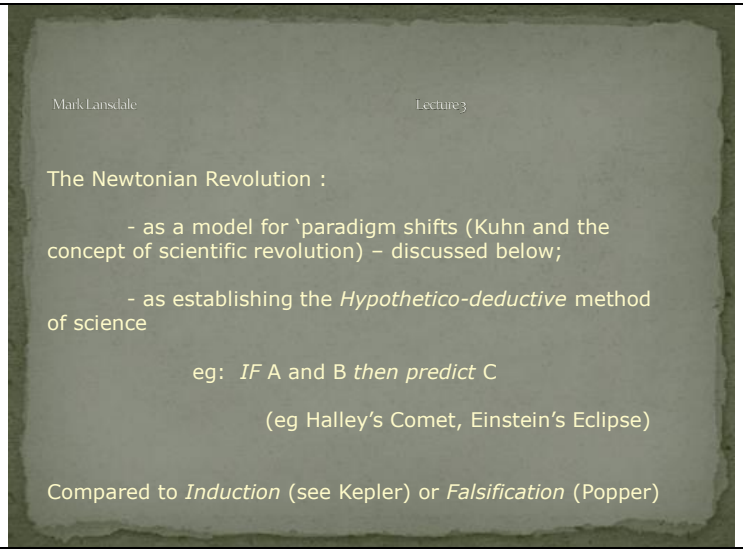
Speech	Slide	Note
…so, in the Chinese ancient cultures, their world view was that in a solar eclipse, what was happening was that a dragon was swallowing the sun. And in the Chinese culture… the Chinese peasants would come out and bash all their pots and pans in the solar eclipse, to frighten the dragon away…		

Figure 21: Example of note originating from the lecturer's speech

Of course, if the lecturer had integrated the slide-text, then the note could have originated from either speech or slide, so where the speech and slide were integrated, the note was categorised as having originated from both. If no match between the note and either of the streams was found, it was assumed that the annotation came from an original observation made by the student.

During this coding it was noted that occasionally students would record the outcomes of interaction during the lecture for instance adding the answers that they or other members of the audience might have given to a lecturer's question. Additionally they might note down their responses to a specific activity which the lecturer had asked them to do on their own. To illustrate this, Dr. Millington asked the students to think of words that either began with the letter 'K' or else had 'K' in the spelling elsewhere to highlight the power of 'availability' or how easily things can be brought to mind. This resulted in the student writing down a list of words containing the letter K, as shown in Figure 22.

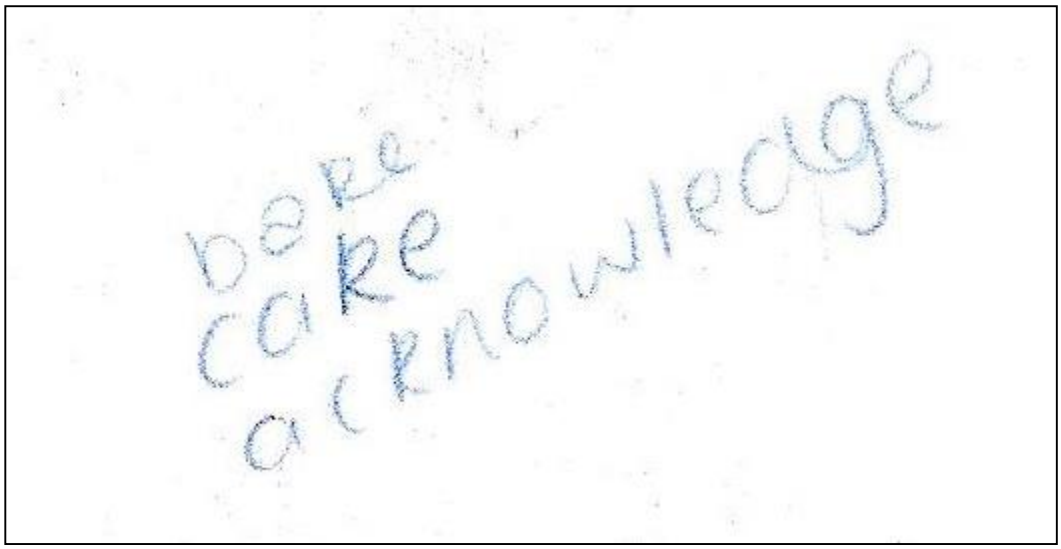


Figure 22: Example of a student note made in relation to an activity

Finally, it was evident that students sometimes made notes to themselves, perhaps to highlight something which needed to be read about after the lecture by writing 'Read about this study later'. This was classed as an 'original' note made by the student. Table 16 shows the breakdown of the origins of the notes by lecturer.

Table 16: Table showing the origin of the notes taken by students for each Phase 2 lecturer

	Origin of note											
	Slide		**Speech**		**Both speech and slide**		**Activity**		**Interaction**		**Original**	
Lecturer	**Count**	**% of notes for lecturer**	**Count**	**% of notes for lecturer**	**Count**	**% of notes for lecturer**	**Count**	**% of notes for lecturer**	**Count**	**% of notes for lecturer**	**Count**	**% of notes for lecturer**
Dr. Brooksbank	55	66.27	19	22.89	7	8.43	0	0.00	0	0.00	2	2.41
Dr. Silcox	152	77.55	30	15.31	10	5.10	1	0.51	0	0.00	3	1.53
Dr. Cullis	21	7.09	256	86.49	17	5.74	1	0.34	0	0.00	1	0.34
Dr. Wormall	24	24.49	63	64.29	11	11.22	0	0.00	0	0.00	0	0.00
Dr. Bradshaw	2	3.39	52	88.14	2	3.39	0	0.00	3	5.08	0	0.00
Professor Morledge	143	65.00	57	25.91	13	5.91	0	0.00	3	1.36	4	1.82
Dr. Millington	6	6.59	66	72.53	17	18.68	1	1.10	0	0.00	1	1.10
Dr. Wren	54	71.05	20	26.32	2	2.63	0	0.00	0	0.00	0	0.00
Dr. Brindley	46	43.81	41	39.05	12	11.43	6	5.71	0	0.00	0	0.00
Total notes	**503**		**604**		**91**		**9**		**6**		**11**	
% of notes	**41.09**		**49.35**		**7.43**		**0.74**		**0.49**		**0.90**	

To examine the extent to which different note-taking practices related with the origin of the information, the origin categories were examined between the two groups of note-taking practices, and are displayed in Table 17 below, and represented graphically in Figure 23 below.

Table 17: Table of the origin of notes by note-taking practice

	Note-taking Practice					
	On Handout			Independent		
Origin of Note	**Count**	**% of category**	**% of total notes**	**Count**	**% of category**	**% of total notes**
Slide	35	8.08	3.09	457	65.29	40.34
Speech	391	90.30	34.51	224	32.00	19.77
Both	22	5.08	1.94	69	9.86	6.09
Activity	2	0.46	0.18	7	1.00	0.62
Original	5	1.15	0.44	6	0.86	0.53
Interaction	0	0.00	0.00	6	0.86	0.53
Total	**455**		**37.17**	**769**		**62.83**

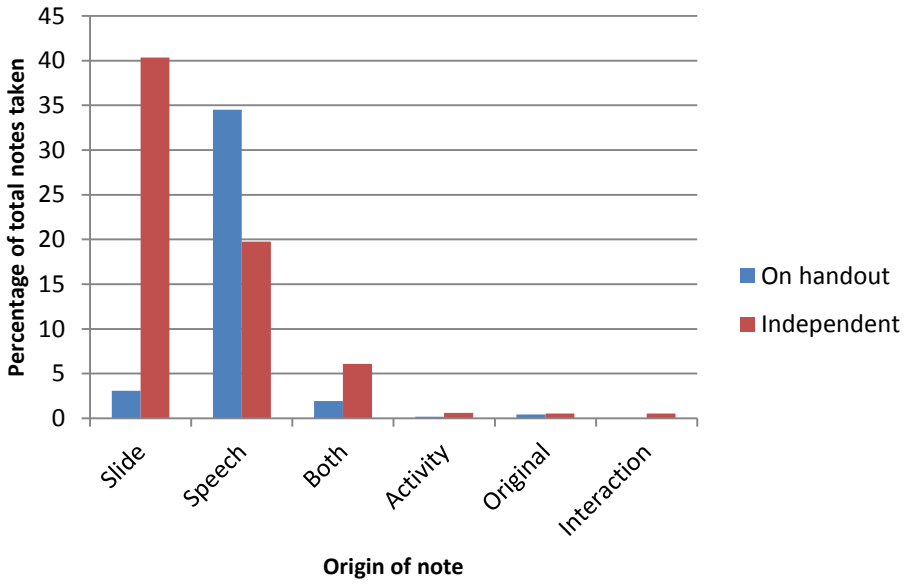


Figure 23 Bar chart representing the origins of notes by note-taking practice

The first thing to note was that those taking independent notes took more notes in general than those who annotated their handouts. This might reflect the fact that for the handout users, the slides are already provided so they do not need to make notes from one of the streams. Those without the handout on the other hand might have felt that they needed to note information from both streams, either so that more

information would 'go in', or because otherwise they did not have the lasting record (although they did have access). Thus they not only wrote more, but the majority of their notes originated from the slide-text. However, it is observed that the notes which originated from the slide-text were predominantly direct copies of the text, or shortened version of the text. As an illustration of this, Figure 24 below shows the notes taken by an independent note-taker in response to a slide displayed at Dr. Wren's lecture. It is important to note that here the lecturer' speech did not mention the two principles detailed in the slide, the 'Cephalocaudal principle' and the 'Proximodistal principle', yet the student copied the text anyway.

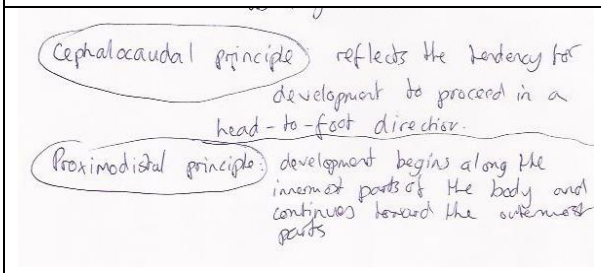
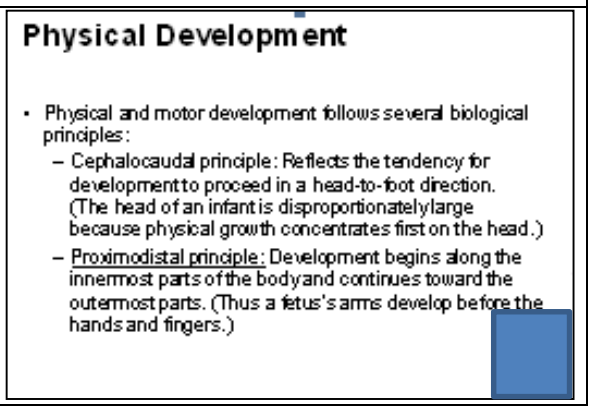
Students' notes	Slide
	

Figure 24: Example of copied notes of an 'independent' note-taker

It is likely that in writing down this information, the student missed the opportunity to focus on and engage with what was actually spoken about during this slide, which was a group discussion related to the size of babies' heads at birth. Although this topic is represented in the slide-text where it says 'the head of the infant is disproportionately large…' this information was not written by the student. Thus the information that the lecturer wanted his students to focus on was not noted in this case.

Interestingly, there was very little evidence of students carrying out any other practices, such as writing down original information or carrying out an activity during the lecture. Of course it is impossible to examine the extent to which students had original thoughts in relation to the information, or the extent to which they wished to follow up on anything in particular if they did not write it down. Yet that such things were not recorded suggests that perhaps students do not consider such instances to be noteworthy, but it also suggests that perhaps the slide-lecture leaves little cognitive space for such thinking. Additionally, it is noted in Table 13 that there were 50 instances of explicit interaction between lecturer and students in the sample, yet only 6 notes were made in relation to such instances. Thus it is reasonable to conclude that students' note-taking primarily focuses on information provided by the speech and slides, and other information is rarely recorded for reference in later study.

This analysis reveals that although lecturers intend for students to annotate their slides, there are in fact two approaches to note-taking; the student either annotates a handout with information from the lecturers' speech, or copies the slide-text. However, the copying of slide-text presents a rather worrying scenario. All of the students had access to the slides via their VLE, so it would be assumed that they did not need to copy the text. Yet in their copying, they might be missing out on explanations or clarification from the speech and, indeed, in the above case, the student wrote down information that was not even spoken about during the lecture, whilst seemingly ignoring slide information that had been spoken about. Of course, it is possible that the student did not write it because they considered it memorable. Yet it is also possible that by writing down the overarching point represented in the text, they missed the speech which made salient the text in brackets which followed the 'main point' of the slide.

The impacts of note-taking on the student experience are discussed later (section 5.6). The following sections outline the results of a qualitative analysis of student focus group responses in relation to their learning experience in slide-lectures, in order to help understand these note-taking practices in their context.

5.5.2 Reported roles of slides and speech for students

A qualitative thematic analysis was carried out on the student focus group transcripts following the same process outlined in section 5.4.1. Here the analysis focussed on the roles that students attributed to the different players in the slide-lecture triad, in order to consider the nature of the slide-lecture experience. Owing to the nature of focus group interviews, it was not possible to quantify the number of students who endorsed specific views. However, it was considered significant that these views were mentioned at all, as it is likely that other members of the lecture audience might share them.

In the case of students, although the slides were not always considered synonymous with the physical slide handout, they did seem to be synonymous with the concept of lecture notes. Moreover, as section 5.5.1 highlights, there seemed to be a perception, especially amongst those who made independent notes, that the slide-text was particularly important. That they were copying this slide-text, and also that the students who annotated handouts were adding information from the speech to the text on the slides indicates that students perceived the slides to be a major driving force in the lecture. This quote illustrates the scenario well:

> All the information that you need to know is on the slides, and then she just explains what's on the slides, so in the lecture

> you learn what it means, and then you go home and revise it from the slides. (Student of Dr. Wormall)

Thus, it seems that students might conceive of the lecture as an event in which, to a significant extent, they go to hear the slide-text being explained. Importantly, it seems that the expectation is that the lecture will help them produce a physical artefact based on the lecture slides (whether copied or annotated) which can be taken away and used again during further study.

In considering the role of both streams then, it seems important to consider which stream is the most important for students, the slides or the speech. Again students seemed to fall into two groups in relation to which stream was the centre of their focus during the lecture.

5.5.2.1 The slide drives the lecture

For some, the slide is the focal point of the lecture. One student reasoned that if the lecturer had included the information on the slide, then this must mean that it is important and as such should be focussed on:

> And it's on the screen you think that must be quite important, so you definitely take it in, and you'll write it down. (Student of Dr. Wilson)

Again this might mean that students are so focussed on the slides that they miss the speech:

> Sometimes you miss some of the additional information that would really help, because you're just trying to get the basic information that he's put on the slide. (Student of Dr. Wilson)

Nevertheless, it is possible that students who have a particular focus on the slides are fairly positive about lecturers whose speech covers the slide information fairly consistently, as the student below explains:

> And he sticks to, he'll go off on little tangents, but he'll stick to the general, of what's on the slide. (Student of Professor Morledge)

In this way the student perceives the lecturer to be sharing their own focus on the slides, as the student above describes his practice as 'sticking to', or following the slide outline, unless his talk is unrelated, which is perceived to be a tangent. Yet it seems that this appreciation for speech which relates to the slide might be taken to an extreme. For instance if the lecturer devotes a lot of speech to information not present in the slide, perhaps by carrying out activities, the student might become annoyed. This issue is identified by the student quoted below, who was explaining why he did not like an activity that was performed during the lecture in which the audience were asked to stand up, then sit down if they agreed with what the lecturer was saying:

> At the end of the day, we're not paying 3 grand to stand up and sit down… I object to it when it's getting in the way of her finishing the lecture, and then we essentially have to go and do her work for her. Which is slightly annoying. (Student of Dr. Brindley)

Here, the student felt that his lecturer had spent so much time on activities that she had not managed to talk about all of the slides in her slideshow. Thus perhaps providing slides in advance of the lecture makes it more obvious to students when the lecturer hasn't managed to fit everything in, as the slides which weren't shown or talked about are evidence of this.

It seems that a focus on the slides might result from students' perception that the slides contain information relevant to later examinations. The quote below highlights this belief, in that although the student admits that important information might come from the speech; the slides are the more important of the two:

> Personally I think it's just personifying the lecture notes. I think it's quite interesting to listen and hear someone's spin on it and give an example, but at the end of the day it's just an example. And I think if you're going to make notes, then obviously if you listen and you find something really important, which he hasn't written down, then you'd write it, but generally the skeleton of what he's written down is I think going to be the general like crux of everything. (Student of Dr. Wren)

At least one of the students in each focus group expressed such an opinion, so this seems to be unrelated to lecturer integration practices. Thus it seems that in a lecture audience, there will be at least some students who focus primarily on the slide-text.

5.5.2.2 The speech drives the lecture

On the other hand, some students focussed more on the lecturers' speech. Again, at least one student in each focus group mentioned the importance of the

speech stream, meaning speech-slide integration has little impact on this focus. One student cited that her capacity for note-taking would be reduced if she tried to read the slides as well as listen to the lecturer's speech, so she prioritised the speech whilst attempting to incorporate the visual material:

> I don't focus as much on reading the slides, but I focus more on what the lecturer is saying. Trying to get that, and then sort of pick out the points that she's relating to in the [slides], so say she was talking about a graph then I'd like look at the graph and try to make sense of it, or looking at the key points, but I don't try to read because if I try to read, then I can't really make notes either. (Student of Dr. Wormall)

Another student considered the lecturers' speech to be crucial and so made a recording of it using a digital recording device. She reasoned that she could then just listen to the lectures speech and try to take it in during the lecture without note-taking, but if she missed anything, she could always go back to the recording. Further, students of Dr. Bradshaw's lecture lamented that although the lecturer had used a lecture capture system for other lectures, she had not done so for the observed lecture, and as such they could not revisit her speech. For these students, then, the speech is the focal point in the lecture as it often cannot easily be revisited, but greater attention can be paid to the slides at a later date.

5.5.2.3 Both are equal

Some students noted the importance of attending to both streams, such as the student quoted below who considered the slides as the basic information around which the lecturer would elaborate:

> It's kind of a real skeleton on the slides and then there's a lot of elaboration from the lecturer. So you've just got to be attentive. (Student of Dr. Wren)

The student is describing a situation in which they must attend to both streams in order to receive a complete account of the lecture. One student noted that this served to facilitate the learning process, as they received two versions of the same information:

> I think it goes in more, because you've got it both visually and hearing it as well. (Student of Dr. Wilson)

However one student identified that which stream to attend to was a choice that students made based on their own learning style:

> I think it depends on how you prefer to learn, which is where I think learning styles come in, so I think it's good because you've got obviously the visuals with the slides then you've got the audition (sic) with him, and you can choose which one you want. (Student of Dr. Silcox)

This comment is perhaps a source of some concern, as lecturers and most other students identified that each stream needed some level of attention because understanding one stream is reliant on at least some engagement with the other.

So it can be concluded that students place their attention on different streams for different purposes. Yet it is recognised that students must be involved in some amount of switching between the two streams for their note-taking and understanding,

thus the slide-lecture does indeed produce an experience in which students need to make links between what is said and what is shown. It is important to note that speech-slide integration is considered to be highly important to the abilities of students to do such linking and thus assimilate both streams of information for note-taking, whichever method they adopt. Therefore the next section considers whether student' interviews suggested any particular integration practices which were beneficial.

5.5.2.4 The importance of speech-slide integration

Some students pointed out that the lecturer explicitly integrating the slides is useful in their note-taking, because it helped them to identify which element was being integrated, and, therefore, where they should make their notes if they were annotating their slide handout:

> She's normally quite good at linking, she'll normally read her bulletpoint first and then elaborate from that, so I find which one she's read and then arrow off and note from it. (Student of Dr. Cullis)

Thus it may be important for lecturers to integrate explicitly in order for students to identify the correct element to annotate on their handouts. This is also highlighted in the quote below, in which the student describes initially struggling to work out which element was being integrated for a particular slide:

> It just threw me, because I was trying to find anything that she was talking about on the slides and it just wasn't on there, and I was like, 'what's she talking about?' Yeah and when she started

> to talk about regulation, I was like, 'oh right'. (Student of Dr. Brooksbank)

As the student points out, an inability to match the speech and slide information might occur when the lecturer was in fact integrating the slide, but it seems that it was not being integrated explicitly. Here the match was not identified until late in the speech. Presumably this confusion might pose a distraction for the student.

The above quotes highlight the reliance of these students on the pointing procedures used by lecturers, as here it was not until the lecturer spoke a word that appeared on the slide that the student could begin to try to understand the match between speech and slide. Thus it seems that the explicitness of the secondary pointing procedures used by lectures is important for students in negotiating the slide-lecture. Furthermore, it might be reasonable to assume that students rely on these procedures to indicate information which needs to be noted down.

In addition to helping with their note-taking, it was suggested that explicitly integrating the slide can be useful for supporting different styles of learning:

> Interviewer: So do you ever notice when speech is quite close to what's on the screen? Does it make any difference to whether or not you can understand it, or make notes?
>
> Student 1: I think it goes in more, because you've got it both visually and hearing it as well. If its two things going off at once you kind of, I don't know what to do but if

they're both saying, and you're writing the same thing, it goes in quite quickly as well

Student 1: It's concrete, if what they're saying is on the screen as well.

(Students of Dr. Wilson)

Thus if the lecturer repeats their slide, they may be helping the student by reinforcing the information. By copying the slide-text which is also spoken, the information is reinforced further.

However, it might be that explicit integration is not so pedagogically beneficial after all. It was also noted that reading out the slides might cause students to switch off from learning as they find it boring to hear and read the same information.

I find that if you've got all the information on the slides, and the lecturers are just reading off the slides, you just read the slide and then switch off. (Student of Dr. Wren)

Here the student reasons that where the lecturer is perceived to be repeating the slide information, it is not necessary to listen to them speaking as well as reading it on the slide. However if we consider that the lecturers in the sample were found not to be mechanically reading out their slides, it is possible that students are deliberately switching off too soon. Furthermore, in some cases it seems it might actually be beneficial for the lecturer to stray from the confines of the slide-text, in order to explain something in more detail:

> If it's something that's quite hard, you're like, give me more, I want to actually understand it as opposed to what you've put on [the slides], because that doesn't make sense. So sometimes you do want them to say more. (Student of Dr. Wilson)

It seems that although students need their lecturer to identify the slide-element they are talking about in order for them to understand the explanation of it, they might be discouraged from attending if lecturers do so too explicitly. Further, if the lecturer says little other than what appears on the slide, students might be left feeling cheated that the lecturer has not explained it well enough. There does not seem to be an obvious ideal solution to the slide-text integration problem. The next section outlines a discussion of these findings in relation to the existing literature.

5.6 Discussion

This chapter has provided a largely qualitative examination of experiences relating to slide-lectures. Such an examination has been needed as, largely, literature has focussed on comparing different types of lecture using outcome measures of learning, ignoring the experiences and intentions making up these occasions of learning. This chapter has characterised the slide-lecture experience as one directed towards the capturing and understanding of slide-text. From the lecturer's point of view, lecturers intend to provide a situation in which the slide provides a structure for student note-taking practices, and this structure is aimed at providing basic information which can be further explained by speech. From the student point of view, there is much focus on what is written on the slides and how the speech makes sense of it. The experience created then is one in which students expect that speech will be related to the slide and that capturing the slide-text and related speech is a

worthwhile activity during the lecture. With this characterisation in mind then, it remains to consider what pedagogical issues might arise from the use of slide-lectures in HE. Perhaps the largest area of concern is the lecturers' and students' interest in the lecture outline, which is used to produce a slide handout, so this discussion begins with an examination of this practice.

5.6.1 The slide-lecture as a means to provide a lecture outline

What seems an important outcome from this analysis is that, for both students and lecturers, the slide-lecture is predominantly understood as a means for students to hear an explanation of the slide-text. The importance of slides for lecturers is their ability to provide text outlines which will be addressed to some extent by their speech during the lecture. Consequently, students thought of the slides as the source of the key information, and the speech as an elucidation of it. Yet Landrum's (2010) survey of lecturers' and students' opinions on the matter reveals that students place more importance on the handout (and therefore the slides) than do lecturers. This might explain why their note-taking practices were reported to favour the information that explained the slides over the additional spoken information, such as tangents, activities and asides. Thus this analysis has potentially shown why focus might be disproportionately allocated to speech that directly relates to, or that serves to explain, this lecture outline, as identified by Savoy et al (2009) and, more recently, Wecker (2012). Yet it is important that in Wecker's study, he found that for students who attach a high subjective importance to slides, attention is more likely to be 'dysfunctionally' allocated towards the slides rather than the speech. The likelihood of them missing information from the speech, then, is higher. This impact was not observed by Wecker for those students who place a lower subjective importance on slides, suggesting that individual differences in the students' attitude towards lecture

slideshows might result in differing levels of engagement with the slides and speech. It is possible then that those who attach a high importance to slides might be more inclined to focus on copying the slides, whereas those who perceive the speech to be highly important might endeavour to free up their attention to listen to the speech by annotating handouts.

Nevertheless, it was acknowledged by all students here that the slides were important. This potentially transforms the lecture slideshow from a visual accompaniment to the lecture into the focal point of the lecture. Support is therefore provided for the suggestion that PowerPoint reduces the presenter to the role of 'stagehand' (Craig and Amernic, 2006). Here, the lecturers' role is conceived of as a spokesperson to explain the outline text. Thus it seems that there is an underlying expectation amongst students that lecturers will have high levels of speech-slide integration, and also employ a 'scaffold' relationship with their slides, even if they do not do so at the actual event. This expectation might be responsible for the practice of copying the slide-text, because students do not assume that the text will be used in any other way, for instance, that it will be commented on or even contradicted, as would happen in a 'referent' relationship. Rather they see slide-text as the 'true' facts that they must learn and understand.

Although it could be argued that this presents a rather dismissive view on the ability of students to identify the 'referent' relationship, it must also be said that the slide-lecture presents the ideal conditions under which students can be enticed into passivity. Indeed Barnett (2003) carried out a study designed to test learning outcomes in relation to conditions in which students were asked to take independent notes from a slide-lecture without a handout, or to take notes from the same lecture with either a skeletal handout or a full handout of the slides. He found little significant

difference in learning outcomes between the independent and skeletal conditions, although the full notes condition was the worst in terms of test scores. Yet he also noted that all of the notes taken in the independent and skeletal conditions closely resembled the information provided on the screen. It seems that in all conditions, the presence of the text was an issue as the 'independent' and 'skeletal' groups' notes resembled very closely (i.e. were copies) of the side text. He argues that the notes may have led students to become passive, as they knew they would be able to read all of the slide information from the handout. Thus the slide-lecture culture presents the idea that there is no need for students to critically engage with the speech or slide-text, rather they just need to know what the text means.

Undoubtedly, the provision of a handout for use during revision is considered to be a beneficial teaching strategy, and has been found to improve learning outcomes in relation to taking notes independently (Morgan, Lilley and Boreham, 1988). However, it seems that handout use as a note-taking aid is less promising. Although the lecturers assumed that students would print out this set of notes as a resource upon which to take further notes during the lecture, students were divided almost equally into those who did this, and those who did not. The importance of this finding lies in the fact that students do not appear to base this decision on how their lecturers integrate the slide with their speech. The students' preferences were directed at 'slides' and 'speech' as a concept, and not to any particular perceived genre of slide or speech (e.g. speech providing a repetition of a slide or commentary of a slide). Thus it is possible that regardless of the type of relationship the lecturer has with their slides, the students might employ the same practices, some of which (i.e. copying) might be ineffective learning activities. Therefore, despite its benefits for use afterwards, the handout practice presents a problem for lecture pedagogy in terms of what is to be

done with it during the lecture. The extent to which the lecturers' integration practices have an influence on student note-taking practices might be worthy of further exploration in some form of comparative study. Such comparison is not the intention here. Instead, the next section examines what might be said about the learning conditions that the slide-lecture experience presents.

5.6.2 The difficulty of the learning experience of slide-lectures

The learning experience of the slide-lecture is rather unique; with the exception perhaps of OHP lectures, never before has it been necessary for students to switch their attention between two streams which represent two versions of the lecture 'text'. Importantly, this situation seems to be ideal for consideration in relation to the CTML. In a slide-lecture, there is the slide with its visual-verbal, note-like outline, and the also auditory-verbal speech, which might or might not address this outline and expand upon it. Potentially then, there is much risk of 'overloading' the verbal channel during the slide-lecture, leading to reduced capacity for students to engage with the two streams.

This overload seems important considering the results it might have in distracting students from identifying the lecturer's relationship with their slides. If a lecturer uses their outline as an object to assess, such as in the 'referent' relationship, then potentially students who have copied the text (therefore focussing on the visual-verbal information) will take away and learn the wrong information. Yet those who annotate the outline (therefore focussing on both visual and auditory verbal information) might have the right idea. These students might be better placed to identify the lecturers' relationship with their slides. This might be responsible for the finding that handout use is positively correlated with learning outcomes (Grabe et al., 2005). However, in terms of the learning situation that slide-lectures create, that

almost half of the students focussed on copying the slide-text is a matter of some concern because simply copying the slide-text is an inefficient learning practice. Although students reasoned that it helped with encoding, it was also argued that they needed to hear the lecturers' explanation. It seems unlikely that students would be able to process the lecturer's explanation adequately whilst focussing on copying slide-text. Furthermore, the same encoding process could be achieved at home, rather than during valuable lecture time. It appears that the inclusion of text in slide-lectures provides a tempting opportunity for students to ease their note-taking duties. Thus it might be concluded from this research that it is important not only for students to have the slide handout available to them for note-taking during the lecture, but also that they should be encouraged or required to print off the handout for use during the lecture.

However, in terms of integration, slide-lectures that include text pose an interesting problem. It can be argued that, based on the CTML model of text and speech processing, students are faced with a difficult learning situation when text is either not integrated, or integrated but not done so explicitly. Crucially, it seems that understanding the lecture depends on engagement with both streams independently. Depending on the students' note-taking practice, this might present a variety of different issues for students regarding where they place their focus. For those annotating a handout then, the text must be integrated explicitly so that the student can understand, for instance, that an explanation relates to a particular point on the slide. Yet for those who take independent notes, it seems that focus is placed primarily on verbally processing the slide-text, so perhaps reducing their capacity to simultaneously process the verbal speech stream. If the speech does not integrate the

text explicitly and consistently, these students risk missing crucial information. Either way, one or both streams are likely to be processed less thoroughly than the other.

5.6.3 Summary: what can be said about the slide-lecture pedagogy?

So the slide-lecture as a pedagogical practice is accompanied by two major issues. On the one hand it may be useful to use a lecture outline for both student note-taking and for structuring the lecture. On the other hand, this outline seems to take centre stage for the students as they strive to either copy it or focus only on the speech that can be directly associated with it. Yet it is worrying that much of the richness of topics covered in the lecture might be lost in this focus on the slides, such that if the lecturer diverges from the outline, the information is not processed in the same way (i.e. by being written down). Further, it is even more worrying that students rarely show evidence of reflection on the lecture material during the session and, even if they do, they do not consider it to be noteworthy. This lack of evidence of reflection is apparent regardless of their note-taking practice. So even if students use the slide handouts as the lecturer intends, if we consider the aim of encouraging engagement in students, to what extent is noting down information from the lecturers speech onto a document prepared by the lecturer conducive of a meaningful and engaging learning experience?

This question remains open, but it is possible that owing to their need to process two verbal streams together, there simply isn't the cognitive resource for such engagement. That students need to process both streams simultaneously using the same cognitive channel (the verbal) might limit students' ability to have a meaningful engagement. Furthermore, considering conceptions of the role of the slide-lecture as a means to provide/ receive a handout, slide lecturing might lead to the perception that an engagement is unnecessary. In this model, students are left believing that if they

can understand the text, they have mastered the lecture. Even practices designed to encourage student engagement with the lecture are considered to be time wasting, as they might prevent the lecturer from finishing the explanation of the slides. In this way, although students might be aided in learning about the things that the lecturer considers 'bulletpoint worthy', their personal engagement is potentially bypassed. Of course, this model might help students to pass exams, which is clearly desirable. Yet it seems important to examine ways in which students might be shown that HE learning is more than just learning and repeating the lecture slides.

Although integration might be important to students' ability to assimilate text with speech during slide-lectures, there does not appear to be an optimal means of integrating text for the kind of learning advocated here. Furthermore, given the temptation that text provides for students to simply copy the slide information and label this adequate learning, it is clearly important to examine the alternatives to text heavy slide-lectures. Instead of focussing on providing a handout then, it is suggested that lecturers remove the temptation for student copying, or for their relying on the handout, and do so by *not* including text in their slides. Thus the next chapter will consider the extent to which slide-lectures might be more engaging for students, and whether lecturers might break away from this predominant slide-lecture culture through considering the integration of non-text elements.

Chapter 6 Can slide-lectures be creatively re-mediated through the integration of multimedia?

6.1 Introduction

The thesis so far reveals a picture of the relationship between speech and slide-text as being one which is dynamic and complex. As a general model, the lecturers' relationship with their slides might be characterised as a 'scaffolding' relationship in which the text acts as a script for the speech, or a 'referent' relationship in which the text acts as an entity to be commented on. Yet the lecturers' relationship with their slides cannot be easily labelled into only one of these two, as they may employ aspects of both throughout the lecture (see section 4.5.4). Further, the slide-lecture pedagogy evokes a certain level of expectation amongst students which might impact greatly on the pedagogical effectiveness of the speech-slide relationship. Students expect their lecturer to elaborate the slide-text, and thus to adopt the 'scaffolding' relationship. Yet it seems that students do not expect their lecturers to comment on the text in the way that was described in section 4.5.3.1, in which the lecturer often contradicted the text on screen.

It seems that regardless of what the lecturer does with the slides during the lecture, students focus their attention around the slide-text as a true outline of the lecture. Indeed both lecturers and students conceive of the lecture as a means to produce a handout of the lecture outline that can be revised. One interesting point was the tendency for lecturers to talk about their use of slides as being synonymous with using a handout, yet give little justification for using it during the lecture. Although they admitted using the slides for themselves as a script or prompt, what was lacking from their justifications for using slides was any acknowledgement of what the slides

did for *students* during the lecture, over and above note-taking functions. For me this raises the following question: if PowerPoint is used predominantly for producing a handout or a script for the lecturer, why do lecturers bother to display it during their lecture? This question becomes even more pertinent when considering the unpredictable nature of lecturers' integration with their slide-text. It might be that integration is a rather secondary concern of lecturers. Thus it is suggested that text presents an interesting predicament for the slide-lecture pedagogy, as although it might be useful for students to use after the lecture, it appears to have little pedagogical value during the lecture. Further, there is clearly much potential for students to miss crucial information which contextualises the slide-text.

That PowerPoint, and particularly slide-text is problematic in an instructional situation is by no means an original observation (e.g. Gabriel, 2008, Harden, 2008, Olliges et al., 2005, Hill et al., 2012). Yet the present research is (to date) unique in pointing out what specifically makes the use of text in lecture slideshows problematic. The problem concerns tensions between how lecturers shape their communications around the text, and how students shape their learning practices around the text. This chapter seeks to consider one of the possible alternatives to a central place for text, one that involves reducing or even removing text in favour of a specific sub-set of visual elements, or VEs.

The chapter begins with an account of the potential benefits of these VEs (section 6.1.1). The data used for the arguments of this chapter is then outlined and the analytic procedures described (section 6.2). Then follows an analysis of the use of the specific subset of VEs, from both lecturer (section 6.3 and 6.4) and student perspectives (section 6.5), in order to consider their potential.

6.1.1 The possibilities of Visual Elements

Given PowerPoint's affordances for the inclusion of multimedia, and therefore, multimodal representations, it makes sense to investigate the extent to which multimedia or, in this thesis, VEs, can provide *an* alternative to text based slide-lectures. Of course there are many alternatives, but as VEs are already used by lecturers, they provide an appropriate opportunity to examine how slight changes to practice might extend lecture pedagogy.

Table 2 and Table 3 in Chapter 4 (summarised below in Table 18) indicated that there are a number of different VE's which are typically incorporated in slide-lectures, and which vary in their polysemic capacity (Rowley-Jolivet, 2002). De Vries and Masclet (2012) argue that when confronted with a monosemic representation, the 'rules' of interpretation are fixed, which when applied to a slide-lecture, means that the student can only read one (or a minimal amount of) meaning from the representation. Polysemic representations, on the other hand, can be interpreted in different ways in different contexts. Thus there is variety in the potential of VEs for conveying multiple meanings.

To illustrate this variety in potential, McCloud (1994) suggests that there is a continuum of 'iconicity' of static representations; some representations are more iconic of what they represent than others. According to McCloud, at one end of a continuum, there is the photograph, which very closely resembles the real life object: for instance, a photograph of a baby. Moving through realistic drawings, to more simple line drawings, the extent to which these representations might resemble the baby becomes reduced. Yet the specificity of their meaning increases. As the detail reduces, the representation becomes more and more symbolic of the thing it is intended to represent. Thus moving further along the continuum there will be found

symbols: for instance, the ‘baby change’ symbol we might see in public facilities. These symbols might not look very similar to an actual baby, but they are arranged only to be structurally similar, so that we can still understand what they are meant to represent. Finally, at the less iconic end of the continuum there is text: for instance, the written word ‘baby’.

The distinctions of such a continuum are important when considering VEs, as some will represent the signified more explicitly than will others. This also means that some will be more explicit and obvious in representing their topic than others, for instance, the word ‘baby’ more explicitly represents the topic of babies than does a photograph of a baby. This is due to the subjectivities involved in reading the photograph. For instance, depending on the perceived age of the baby, the photograph could be considered to be representing a new-born baby or a toddler. Moreover, depending on what else is in the photograph, for instance, a mother or father, it is uncertain whether the photograph actually represents the topic of babies at all. Here the viewer would need some contextual information to work out what the photograph is representing, whereas the need for context is reduced if the word is written. That is not to say that text cannot also contain multiple meanings; the word ‘baby’ might be referring to human babies but it might be referring to elephant babies, for example. In this case the photograph would be more explicit, in that it specifies the species of baby.

Nevertheless, it is accepted that visual and text representations convey their specific meanings differently (see sections 2.6.3.1 and 2.6.3.2) and, moreover, different types of VEs might convey meaning differently. Thus students need to employ different analytic strategies to uncover their meanings and these associated processes. For text reading, this involves verbally processing the text, one word

before the other in a linear manner. Yet for VE's the process is not linear, and involves different aspects of perception (Barry, 1997) which might be influenced by the type of VE being processed.

As Table 18 details, photographs, videos and images are polysemic, and so they might convey multiple meanings which vary depending on the context in which they are presented. However, graphs and diagrams are monosemic, meaning that they have a finite potential for conveying meaning.

Table 18: Summary of the different types of element employed in slide-lectures and their characteristics

Type of visual	Sub-type	Semiotic System	Monosemic or Polysemic?	Visual or Text Element?	Frequency in Phase 1 Sample	Frequency in Phase 2 Sample
Scriptural	Bulletpoints	Linguistic	Monosemic	Text	1522	1129
	Structural text	Linguistic	Monosemic	Text	386	272
	Quote	Linguistic	Monosemic	Text	15	6
Graphical	Graph	Visual	Monosemic	Visual	18	19
	Diagram	Visual	Monosemic	Visual	19	14
Figurative	Photographs	Visual	Polysemic	Visual	68	86
	Images	Visual	Polysemic	Visual	14	48
Numerical	Pure numerical	Mathematical	Monosemic	Text	4	9
	Textual numerical	Linguistic	Monosemic	Text	7	6
	Mixed	Mathematical & Linguistic	Monosemic	Text	4	2
Dynamic	Video	Visual	Polysemic	Visual	24	10
	Dynamic Diagram	Visual	Monosemic	Visual	1	0
Resources	Web resource	-	-	-	18	3

6.1.1 Static Polysemic Visual Elements (SPVEs)

For the purpose of this chapter, those VEs which are polysemic shall be emphasised, as these provide more potential for both conveying meanings (for the lecturer) and for perceiving meanings (for the student), and therefore present an

interesting resource. Although videos are considered polysemic, the chapter will focus on *static* polysemic VEs which do not have an accompanying verbal narrative, as videos often do. Thus this chapter will focus on the use of photographs and images in slide-lectures. Before considering how these static polysemic VEs (hereafter referred to as SPVEs) can be best integrated into slide-lectures, it is worth considering further how students might process them.

6.1.1.1 Processing SPVEs

At a basic level, it must be noted that the processing of SPVEs along with speech in a slide-lecture is likely to be an easier task than the processing of text with speech. This is due to the difference in presentation modality inherent in SPVEs: they are visual rather than verbal. According to Mayer's (2005a) CTML then, SPVEs will be processed in the visual channel, whereas speech will be processed in the verbal channel. Thus the student should not be overloaded in one processing channel when receiving SPVEs and speech simultaneously.

Yet the promise of SPVEs reaches further than simply affording ease of processing. Polysemic representations have semiotic affordances which monosemic representations do not. De Vries and Masclet (2012) describe the affordances of polysemic representations as such:

> 'In polysemic representations, a particular configuration in the environment can have multiple meanings. In fact, the signification of an inscription has to be inferred from the configuration of inscriptions. Polysemic representations are often used in fuzzy contexts, where one needs to express the possibilities one has in mind, which are not certainties.' (p. 5).

Thus the meaning that can be read from polysemic representations is open, so processing them is a much more creative task than the processing of monosemic representations such as text, graphs and diagrams. Potentially then, there should be more potential for students to have a meaningful engagement with the material, as they creatively attempt to uncover the possibilities of what is being represented.

This process aligns well with the theory behind 'desirable difficulties' in which 'certain conditions that pose difficulties and challenges can both impede performance and enhance long term retention' (Bjork and Linn, 2006, p. 1). In conditions that introduce desirable difficulty, the student is forced to generate the information rather than being told. A simple example would be working out the answer to a sum versus being told the answer. When a condition introduces 'desirable difficulties' then, although the student is slowed down in their processing, their memory for the information that they are processing is likely to be greatly improved compared to a condition in which they are simply told the same information. Thus in being given the opportunity to uncover meanings, as provided by SPVEs, students might at least remember the information, or even have a deep engagement with it as they try to read its meaning.

There is much knowledge about how people read meaning from SPVEs, for instance, Russel (1993) suggests there are a number of ways in which this reading is achieved in relation to photographs. These range in complexity from 'observation', in which the denotation of the photograph is searched for; 'interpretation', in which meaning is sought by asking questions of the photograph; 'personal memories', in which the photograph is woven into the viewer's past experiences; 'participation', in which the viewer enters the scene and attempts to experience the scene for themselves through imagination; and 'medium intrusion' in which the viewer ponders on the

environmental context of the photograph being taken (Russel, 1993). It seems that students might take particular approaches when viewing photographs which affects the reading that they make of it.

Yet the meaning one can read into a representation is context specific (de Vries and Masclet, 2012). For instance, the same photograph of a baby with its mother, used in an Attachment Theory lecture in psychology, might carry different meanings if used in a lecture on paediatric medicine. One way in which context can be determined in a slide-lecture is through the slide-text, or even the lecturer's speech. There is a large body of research considering how people process SPVEs that are accompanied by text, such as in the slide-lecture. For instance, writers in multimodality studies suggest that students incorporate information from the text into their SPVE processing when viewing, for example, illustrations in text (Levin, Anglin and Carney, 1987, Carney and Levin, 2002) or photographs in textbooks (Pozzer and Roth, 2003).

Schnotz (2005) proposes an integrated model for this text and 'picture' processing. In this model, the reading one makes of each representation is dependent on the other, so although text and SPVE information enter different channels, they are ultimately processed together in order to build conceptual understanding. Here, there is a distinction between 'descriptive' and 'depictive' representations (Schnotz and Bannert, 2003). In processing 'descriptive' representations, which includes text, graphs, diagrams and other monosemic sign-based representations; students take the meaning directly from the representation and integrate it into their mental models. However, in processing 'depictive' representations, which include photographs and images (therefore polysemic representations), students apply their existing mental models to the interpretation of the representation.

Applied to the slide-lecture, it can be assumed that when seeing SPVEs and hearing or reading related verbal information together, the different representations will be integrated into the building of a mental model to create one schema for the concept. However, given the arguments made in the last chapter against the use of text, based on suggestions that processing text and speech simultaneously might lead to inefficient learning practices, it is possible that lecturers' speech is more important to this interaction than slide-text. Particularly, bearing in mind the contextual specificity of reading SPVEs, it seems that the *explicit* integration of the SPVE with the speech might be important. Indeed Moreno and Valdez (2005) tested the effects of students make meaning for themselves out of instructional images. In an experimental design comparing those given an interactive task in which they were required to work out the order of images depicting a process, and those given the images already sorted into order, the students with the pre-determined order performed better in subsequent tests of knowledge of the depicted process. Although contrary to expectations, this finding was thought to be related to the limited opportunity for the students without instructor guidance to reflect on their activity, in order to evaluate the task they had completed. It was argued that although there was a greater level of cognitive engagement in the task, 'deep learning' is not promoted in such learning strategies unless students are given the opportunity to reflect on, and receive feedback on their activities from their instructor. It seems that having the instructors input was beneficial for students in interpreting the images. As such, the recommendations were that instructional design should seek to maximise the opportunity for students to reflect on activities using images; for instance, by evaluating their own responses before having the 'right' response modelled for them.

Thus it may not be sufficient to merely have students interpret SPVEs; rather, guided reflection on their own interpretations might be required for meaningful learning. Therefore the mediation of the visual and verbal streams by the lecturer seems important. An examination of the functions of SPVEs might shed light on how this mediation is achieved.

6.1.1.2 The functions of SPVEs

Carney & Levin's (2002) functions of 'picture' use in text suggests that there are 5 basic functions: 'decorative', 'representational', 'organisational', 'interpretational' and 'transformational'. According to Carney and Levin, 'decorational pictures simply decorate the page, bearing little or no relationship to the text content' (Carney and Levin, 2002, p. 7). Here as the SPVE is not mentioned in the text, it is argued that 'decorative' images have the least benefits for teaching and learning. Furthermore, there are suggestions that 'decorative' images might even interfere with understanding as they distract the student from the instructional message (Schnotz and Bannert, 2003, Mayer and Moreno, 2003).On the other hand, 'transformational' SPVEs:

> '… include systematic mnemonic (memory enhancing) components that are designed to improve a reader's recall of text information. Here, information is often recoded to make it more concrete and then related by way of a meaningful, interactive illustration' (Carney and Levin, 2002, p. 7).

Here the SPVE would be heavily referenced by the text, such that the SPVE and text can be considered to be components of a single message.

There are many more conceptualisations of the functions of such visual representations in different types of text (for example Duchastel, 1978, Hunter, Crismore and Pearson, 1987, Kress and Van Leeuwen, 1996, Martinec and Salway, 2005, Duchastel and Waller, 1979) although these categorisations might use different terminology. For instance, Carney and Levin's 'decorative' function can be compared to Duchastel's (1978) 'attentional' category. In terms of how their functions are identified, it is usually suggested that the text makes some reference to the SPVE which identifies it. For instance Pozzer and Roth (2003) identified 4 categories of photographs in science textbooks through considering the accompanying captions; 'decorative' which were not accompanied by a caption, 'illustrative' which were accompanied by a caption, 'explanatory' which have captions classifying what is represented in the photograph, and 'complementary' which are accompanied by captions which identify new information. Thus the extent to which the text makes reference to, or integrates the SPVE can reveal the function of the SPVE in written instructional materials. Further, it seems that differences in the extent to which 'pictures' are referenced by text are correlated with the extent to which they are beneficial for learning. Applied to the slide-lecture then, the extent to which the lecturer integrates the SPVE is important for signalling to the student the function of the SPVE.

Yet despite the wealth of literature considering the functions of SPVEs in written texts, the evidence base for the functions of SPVEs in slide-lectures is sparse, and the evidence of students' reactions to different functions smaller still. In the small body of literature available on the functions of SPVEs in slide-lectures, it is suggested that lecturers have particular motives for presenting them. Jin (2010) outlines a multitude of functions that lecturers might intend for their SPVEs, such as supporting

attention, activating or building on prior knowledge, minimizing cognitive load, building mental models, supporting transfer of learning, or supporting motivation. However, in Jin's study it seems that students did not necessarily understand the function of SPVEs that lecturers intended for them. Rather, students often selected *more* and different functions for the SPVEs used than were intended (Jin, 2010). Still, it was not clear in Jin's study how the SPVEs were integrated into the lecture. For instance, did the lecturer explicitly mention the function of the SPVE? Or did their speech/ slide-text provide any clues as to what the function might be? It is possible that since students often did not identify the lecturers intended function, these SPVEs were being left to speak their function for themselves.

Nevertheless, it makes sense that, as SPVEs are being processed visually in the visual channel and the speech processed verbally in the auditory channel, it would be easier for students to assimilate a SPVE along with the lecturers' speech than it would be for the assimilation of text. As the need to read and listen to separate verbal streams simultaneously is not present for SPVEs, it is entirely possible that SPVEs might provide the conditions in which students can have a meaningful engagement within the slide-lecture. Furthermore, this experience can be tailored by themselves through their own prior knowledge. This would fit the pragmatist description of learning outlined in Chapter 2, in which learning is a process of experiencing and applying these experiences to prior knowledge and future goals. It is reasonable to assume that SPVEs have much potential for meaningful learning (and teaching) during slide-lectures.

So, given that each student views the SPVE through the lens of their existing knowledge and the context of viewing and, as a result, each student's reading of the SPVE will be different, it seems important to understand the extent to which such

reading is modelled for the students by the lecturer. However, the extent to which SPVEs are pointed to at all by lecturers, whether visually or verbally, is unclear. Along with considering the functions of SPVEs then, it might be profitable to consider how they are integrated into the lecture, as this might provide crucial cues for students in understanding the function of the SPVE, and how it is meant to be used and understood. So this chapter considers their use in the sample of lecturers collected.

6.2 Study 3: Considering the use of SPVEs as an alternative to text in slide-lectures

The chapter seeks to examine the use of multimedia, specifically SPVEs in slide-lectures, and the experiences surrounding their use. This chapter recruits the corpus of lecture transcripts generated by Phases 1 and 2 of the research. Additionally, it makes use of the individual interviews, the focus group interviews and document data collected during Phase 2.

6.2.1 Research question to be addressed

The overriding research question for this chapter is; **can the slide-lecture be re-mediated through the integration of multimedia to encourage engagement?** As identified, SPVEs are potentially interesting types of multimedia, and therefore form the focus of this question. Three areas of study were identified through the above review of literature, which can be combined to answer this question. These are:

1. To what extent are different SPVEs integrated into the lecture speech to perform different functions?
2. What are the lecturers' intentions behind the different functions SPVEs in slide-lectures?

3. In what ways do students use the SPVEs?

6.2.2 Outline of the analyses

The analysis of this data is broken down using the three sub-questions for this chapter. Each question draws upon different parts of the collected data. Further, owing to the multimodal variety of this data, a number of analytical approaches were taken.

In order to examine the functions of SPVEs as indicated by their integration with speech, the instances of use of SPVEs in slides were identified in the lectures. These slides along with their accompanying speech were compiled and imported into NVivo 9. Specifically, the transcripts are analysed using an 'intersemiotic complementarity' framework to identify the role that SPVEs played within the lectures. This analysis is described further in section 6.3 below.

Next in order to consider the lecturer's purposes for including SPVEs in their slide-lectures, the lecturer interview transcripts were examined using a thematic analysis. Here, any reflections specifically relating to the use of SPVEs were selected for analysis. Where the lecturer discussed the use of SPVEs then, these sections of the interview were imported into NVivo 9 for analysis. The analytical process for this data is outlined in section 6.4 below.

The students' notes were scrutinised for any writing which could be linked to SPVEs in the lecture, as this might reveal insights into how the SPVEs are treated by students. This was achieved through a content analysis of the notes, the procedure for which is detailed in section 6.5.1 below. Finally, student focus groups were subjected to a thematic analysis. In analysing the student focus group interviews, where the specific slide had been discussed as stimuli, it was possible to identify where talk

related to specific SPVEs from the lectures. In these cases the SPVE being referenced along with its accompanying speech and slide-text were identified in the lecture transcripts and added to the interview data. Additionally, any discussion related to SPVEs in general was also selected for analysis. The procedure for analysis is outlined in section 6.5.2 below.

6.3 Lecturers' observed use of SPVEs

The lecture transcripts were interrogated to identify the extent to which SPVEs were integrated with the lectures' speech, and the usage, or 'function' that this integration suggested. In Chapter 4, deictic features of speech were used to establish a link between the text and the speech, based on a semantic analysis of both. Thus where the speech transmitted the same message as the text, it was considered that the lecturer was pointing to the text. However, SPVEs rarely contain text; rather they contain multiple modes of meaning, and therefore varying levels of iconicity/ polysemy. Thus it was not possible to merely look for the matching speech and text. Here different methods were needed in order to identify what message was being communicated by the SPVEs, along with identifying their integration in the speech.

Such considerations inevitably involve some amount of 'reading' of the SPVEs in order to define what was being shown in the SPVE, before it was possible to ascertain whether it was referenced. As noted, in SPVEs there are a variety of possibilities of meanings to be integrated by the speech, some being more obvious than others. For example when viewing a photograph of a woman and a baby, the words 'woman' or perhaps 'mother' and 'baby' would be more obvious to recognise than 'relationship', 'attachment behaviour', and so on, although the photograph might carry these meanings in the context in which it is used (i.e. an Attachment Theory

lecture). Further complicating matters is the fact that the extent to which such observations are made can vary depending on a variety of factors such as the reader's interest in the SPVE, semiotic skills or visual literacy, and prior knowledge about the topic. This is an important point, in that students might vary in the reading that they make of SPVEs used during lectures. For analytical purposes then, a suitable framework was needed to guide the identification of integration of SPVEs.

6.3.1 Identifying the integration of SPVEs

Perhaps the most utilised framework for describing cohesive relations between verbal and visual representations is Royce's (2007) framework for identifying 'intersemiotic complementarity' in visual-verbal texts (in Unsworth and Cleirigh, 2009). According to Royce, text makes references to visual representations through 'sense relations' (as introduced by Halliday and Hasan, 1985). This can be achieved by the speech repeating a semantic meaning represented in the SPVE, for example saying 'baby' when a photograph of a baby is displayed. Additionally, this can include different words for the same concept, such as 'infant', 'child' and so on. Applied to slide-lectures then, the basic link between SPVEs and speech can be identified by the speech referencing the obvious meaning present in the SPVE. But crucially for Royce, identifying where a SPVE's semantic meaning appears in the accompanying verbal narrative involves three 'elements' (or metafunctions) in which the narrative will either make reference to;

1. The represented participants, i.e. *what* is objectively shown in the SPVE,
2. The interactive participants, i.e. the relation between the viewer and the shower of the SPVE,
3. The coherent structural elements, i.e. the context of the represented participants and the SPVEs' position in the text (Royce, 2007).

Crucially for slide-lectures then, although the lecturer can make reference to features that are objectively present in the SPVE (i.e. the represented participants), they can also make reference to subjective meanings (the interactive participants, 2 above) and the coherent structural elements (3 above). Thus it is important to note that although there may be many meanings identifiable in the SPVE, it is the meanings that are made explicit by the lecturer to their students which were in question. In relation to the represented participants (i.e. the actors/ objects in the depiction), this can be achieved in a similar manner to the use of recognition markers in text-speech integration, by simply saying the semantic meaning that is obviously represented in the SPVE. However, in relation to the other two levels, this requires the lecturer to make mention of the intended meanings by explicitly pointing to the SPVE, such as by saying 'this photograph shows…' or else referencing the purpose of the SPVE in the lecture, or its contextual meanings (i.e. 'I've included this photograph because…').

Royce's framework along with his description of sense relations was drawn upon for analysis of the integration of SPVEs with speech. In order to identify the lecturers' function, and therefore the student's 'agenda' for viewing the SPVE, the integration of the SPVE for the particular lecturer was identified through considering each SPVE in relation to three questions adapted from Royce's framework:

1) Does the speech make reference to the object(s) apparent in the SPVE?
2) Does the speech make mention of the lecturers' intention behind showing the SPVE?
3) Does the speech refer to the meaning of the SPVE within the wider context of the lecture?

The transcripts of all the lectures collected were analysed in this way to consider the extent to which lecturers make verbal references to the SPVE such that the student is given an unmistakable agenda for viewing it. Each of the SPVEs used, and its accompanying speech (i.e. the speech attached to the slide in which the SPVE appears) were subjected to the questioning described above. It must be noted that only speech that occurred *whilst the SPVE was displayed* was examined, and speech that occurred whilst surrounding slides were displayed was disregarded. Although it is acknowledged that preceding and later speech can be used in making sense of the SPVE, it is only the speech that occurs whilst it is being displayed which *integrates* the SPVE. In other words, the speech and SPVE cannot display intersemiotic complementarity if they occur separately. Thus the speech given throughout the whole time of display for the slide was examined for the extent to which it made reference to the objects in the SPVE, the lecturer's intention for showing the SPVE, and the extent to which they made reference to the relation of the meaning of the SPVE to the context of the lecture. In doing so, it was noted that there were some common 'functions' of SPVEs in lectures. These are described in the next section.

6.3.2 The functions of SPVEs in slide-lectures

In some cases the lecturer appeared to verbalise the salient feature shown in the SPVE. For instance in Figure 25 below, the most obvious observation of the photograph is that it contains ducks. When consulting the speech, it is apparent that the lecturer mentions ducklings, but makes no further mention of anything that is clearly represented in the photograph, nor her reasons for showing it.

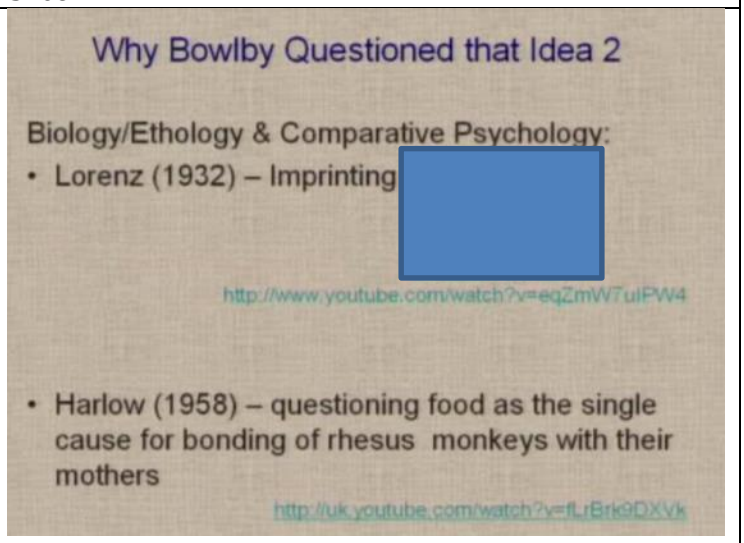
Speech	Slide
… And Konrad Lorenz you might have heard of already also, he worked in Vienna and he had, he came up with the theory of imprinting, in which he shows that when for instance **ducklings** are born, they react very strongly to what they see at that moment. So they are kind of imprinted to follow their mother…	

Figure 25: Example of a representational SPVE used by Dr. Ealy

Here it is clear that the lecturer wanted to show something to students yet there is no further interpretation of the photograph, or other instructions to students in relation to it. Thus it might be considered that the function of this SPVE is to show or to *represent* something in the speech. In this case, ducks.

In some cases, the lecturer might take the references to the SPVE further, for instance in Figure 26 below, the lecturer first mentions the intention behind showing the photograph; that he wanted his students to identify its salience. He does this by asking 'Do you need me to explain what's salient about this particular image?' Then he goes on to explain the concept that the photograph is intended to represent. Here, although the photograph might again be considered to be representational, the lecturer explicitly identifies what it is intended to represent through explaining its relation to the context of the lecture.

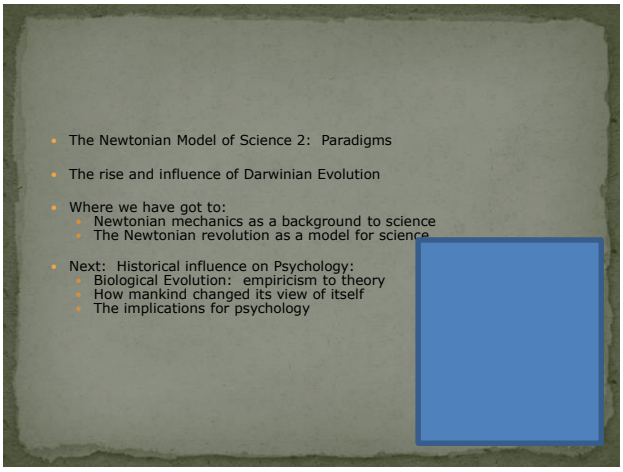
Speech	Slide
… So I've put this image on the screen, of the terminator. Who has not seen the film Terminator? Heathens. **Do you need me to explain what's salient about this particular image? Perhaps I shall**. The thing is that this is a robot. I think in this particular version of the film, I think this is from Terminator 2, so this is a good robot, Terminator 1 it's a bad robot, and this robot does all sorts of things which are heroic and ultimately, do you mind me spoiling the film for you? This is your last chance, he sacrifices himself. If he is the right word. **But the key issue is; is this creature human, is it alive? It looks like a human it talks like a human it has cognitive functions, which seem remarkably effective, if not slightly better than humans in lots of ways, much more effective in terms of information processing, but the key question that's going to run through the lectures is; is this creature alive and what does it mean to even talk about that creatures cognition? And you can't see this separate from the question if you like in plain English that other people will understand is does this creature have a soul? Because there's a religious question there as well. Because if this creature, if this creature can emulate human beings in every sense, why shouldn't it, why shouldn't that represent, now that of course this creature is driven by computer chips. Why shouldn't that model of mental life apply to us also?** Is the brain a computer or is it a vehicle for our souls? That is the question. Ultimately the theological question that underpins all of this…	

Figure 26: Example of a Symbolic SPVE used by Professor Morledge

Here the photograph of the Terminator is intended to represent the questions underlying much of Psychological reasoning and the lecturer achieves this by asking of it 'But the key issue is; is this creature human, is it alive?' He then goes on to

outline how this relates to psychological reasoning through making the case that although it looks human, it arguably is not, as it is difficult to establish whether it has a soul. Therefore he asks can reasoning about human psychology be applied to it? Although the photograph represents 'the Terminator', it is used to represent something entirely different in the lecture. In this way the photograph functions *symbolically* for a concept whereas the representational SPVE in Figure 25 functions descriptively. The way that this differs from being simply representational is that the lecturer tells his students that the SPVE stands for a different concept. So whereas a representational SPVE might also be symbolic, it is the explicitness of the lecturer telling the students about the concept it symbolises that makes this category of SPVE use distinct. However some instances of SPVE use seemed to involve further mention of the lecturers' intention for the SPVE, which gives students an agenda to engage with the SPVE. For example:

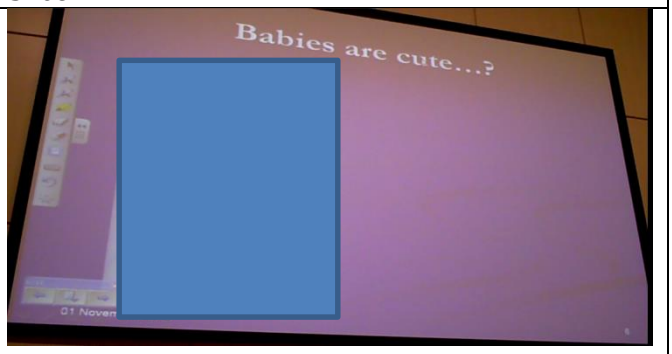
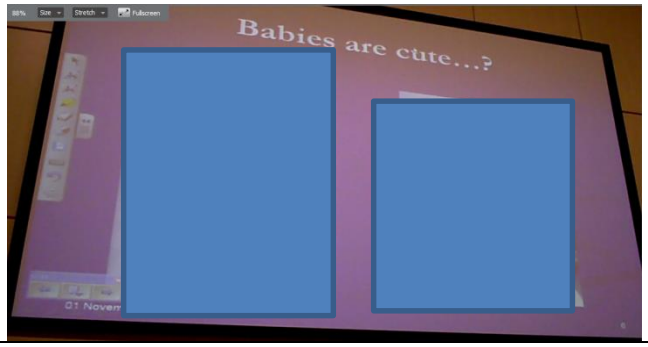
Speech	Slide
So, hands up if you think this is quite a cute baby? Hands up if you just hate babies. Ok a few baby haters in the room. Obviously you can guess what I've done, just to prove how powerful this is as an illusion **let me just show you what happens to this cute little baby as it turns around** (Adds photograph) **You see it's even more powerful when you take it with something you have this automatic affinity for, it's a cute little baby but upside down, it's still cute and nice, but the other way around it suddenly turns into Gomez Addams.**	 

Figure 27: Example of demonstrational SPVEs used by Dr. Wilson

In this sequence, the lecturer gives his students a specific agenda for viewing the photographs; that they should be having a reaction to them. Here the lecturer articulates the relationship that the students should have with the photographs by saying ‘hands up if you think this is quite a cute baby?’ The lecturer invites the students into an engagement with it, before *demonstrating* what happens to their engagement if he makes changes to the photograph. Although the photographs are also representing a concept, they are being utilised further than to merely show the concept. Rather, they are being used to *demonstrate* a concept, in this case, that visual processing can be tricked.

This function was evident in those lecturers who pointed out specific parts of the image, such as ‘if you look at this here...’ or ‘as you can see on the left’. Often the lecturer even asked students’ questions specifically related to this demonstration, such as the above lecturer who asked students to consider whether it was a cute baby.

However, in some cases the SPVE was apparently not referenced at all by the lecturers’ speech. In these cases, although the SPVE might have been included for a particular purpose, the lecturer does not make this purpose explicit. For instance Figure 28 below lacks any form of reference to the SPVE which shows a child walking up a staircase:

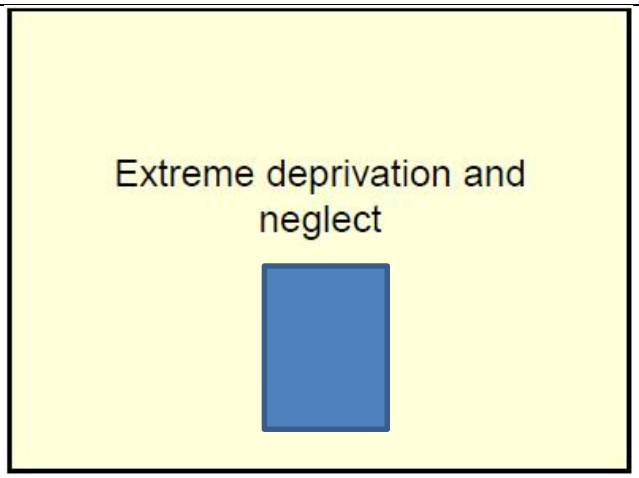
Speech	Slide
Ok, has anybody got any questions about what we've just covered so far? Yes? (Audience question: inaudible) About what sorry? (audience response: The difference between institutional children and foster children) In terms of what sorry? (Audience response: you said that the institutional children had more attention or something?) Yeah, they were more hyperactive and they showed higher emotional disturbance. Yes? (Audience question: what does monotropism mean?) It's about forming attachments to just one person, so mono as opposed to, ok. Great. Right, what happens then when you undergo some kind of extreme deprivation or neglect? We're going to have a look at this now…	

Figure 28: Example of decorative SPVE used by Dr. Cullis

Here there is apparently no mention of the photograph in the lecturer's speech, further than what might have happened unintentionally. For instance the lecturer says 'just one person' and indeed, in the photograph, there is just one person. However it can be assumed that since this link came from an answer to a question from the audience that the lecturer could not have anticipated, the photograph was not explicitly referenced here. Of course it might be considered that the SPVE is representational or even symbolic of something that the lecturer is talking about. Yet

since there is no mention of the SPVE, the student is given no clues as to their agenda for viewing the photograph (and thus the lecturers' function). The SPVE then is considered to be functioning to *decorate* the slide.

6.3.3 A taxonomy of functions of SPVEs in slide-lectures

In considering the functions of SPVEs based on their observed integration, it appeared that there were 4 functions that were carried out by lecturers through using SPVEs. These are described and quantified in Table 19 below.

Table 19: Table showing the taxonomy of functions with the prevalence of the 4 SPVE functions in both samples of lectures

Function	Definition	Prevalence in relation to SPVEs Phase 1 Sample	Prevalence in relation to SPVEs Phase 2 Sample
Decoration	Although the SPVE might convey any number of meanings, the lecturer does not reference these in relation to the lecture, thus the student is not given a specific agenda for viewing the SPVE other than looking at it.	19 (23.17%)	16 (11.94%)
Representation	The salient feature of the SPVE is articulated by the lecturer, such that the SPVE is indicated to be a visual representation of the topic in question. In this way the students' agenda for viewing is to link the SPVE to the topic.	47 (57.32%)	61 (45.52%)
Explicit Symbolism	The lecturer explicitly explains that the SPVE is intended to act as an indicator for a broader topic, which is not necessarily observable in the SPVE. The students' agenda is to associate the topic that is represented in the SPVE to the broader topic.	0 (0%)	2 (1.49%)
Demonstration	The lecturers' speech expresses that the SPVE provides visual evidence of the topic in question by identifying and explaining the relevant features. The lecturer might ask students questions about the SPVE in relation to the topic. The students' agenda is to search for the relevant features and meanings in the SPVE.	16 (19.51%)	56 (41.79%)

It is noted that each of these functions represents a different level of exploitation of the potential of the SPVE, through increasing the explicitness with which students are given an agenda for viewing the SPVE. The extent to which students are invited to engage with the SPVE varies along a continuum. At one end the student is invited to simply view the SPVE when it is used for 'decoration', or understanding the link between SPVE and speech when it is used for 'representation'. 'Explicit symbolism' takes this further for the student to a requirement for them to

understand that the SPVE represents a different concept than what is appears to represent. This engagement goes further still in ‘demonstration’ where the student is required to actively engage with and interpret the SPVE in order to think about it as evidence for the topic of study. The functions then are listed in order of increasing exploitation of the SPVE.

It is worth making clear that these functions do not describe the function of the SPVE *per se*, rather they describe the function as identified (or not) by the lecturers’ speech at the time of showing the SPVE. It should also be noted that it is possible for each SPVE to have more than one function. For instance, if the lecturer changes topic in their speech but still displays the SPVE, then that SPVE would be considered to be ‘decorative’ for that section of speech, even if the lecturer has previously used it for ‘demonstrational’ purposes. Therefore the SPVEs are categorised according to the maximum level of exploitation that was carried out with the SPVE, but the coding does not preclude multiple functions below this level of exploitation (except for ‘decoration’).

Using this taxonomy of identifiable functions of SPVEs, it was possible to establish, for each instance of SPVE use, what the apparent function was for the lecturer. This analysis is presented in Table 20 and Table 21 below.

Table 20: Table showing the function of SPVEs in Phase 1 lectures

Lecturer	Function							
	Decoration		Representation		Explicit Symbolism		Demonstration	
	No.	% in lecture	No.	% in lecture	No.	% in lecture	No.	% in lecture
Dr. Wright	0	0.00	0	0.00	0	0.00	0	0.00
Dr. Moss	4	40.00	6	60.00	0	0.00	0	0.00
Dr. Leaman	6	35.30	8	47.06	0	0.00	3	17.65
Dr. Vickers	0	0.00	5	100.00	0	0.00	0	0.00
Dr. Lake	2	66.67	1	33.33	0	0.00	0	0.00
Dr. Ealy	1	14.29	6	85.71	0	0.00	0	0.00
Dr. Jackson	2	100.00	0	0.00	0	0.00	0	0.00
Dr. Cooper	1	33.33	2	66.67	0	0.00	0	0.00
Dr. Kemp	0	0.00	0	0.00	0	0.00	2	100.00
Dr. Underwood	2	6.90	18	62.07	0	0.00	9	31.03
Dr. Horsley	1	25.00	1	25.00	0	0.00	2	50.00

Table 21: Table showing the function of SPVEs used in Phase 2 lectures

Lecturer	Function							
	Decoration		Representation		Explicit Symbolism		Demonstration	
	No.	% in lecture	No	% in lecture	No.	% in lecture	No.	% in lecture
Dr. Brooksbank	2	33.33	4	66.67	0	0.00	0	0.00
Dr. Gray	0	0.00	8	72.72	0	0.00	3	27.27
Dr. Silcox	1	50.00	0	0.00	0	0.00	1	50.00
Dr. Cullis	1	14.29	6	85.71	0	0.00	0	0.00
Dr. Wilson	5	18.52	8	29.63	0	0.00	14	51.85
Dr. Wormall	3	12.50	4	16.67	0	0.00	17	70.83
Dr. Bradshaw	0	0.00	0	0.00	0	0.00	7	100.00
Professor Morledge	0	0.00	7	70.00	2	20.00	1	10.00
Dr. Millington	0	0.00	4	80.00	0	0.00	1	20.00
Dr. Wren	2	13.33	11	73.33	0	0.00	2	13.33
Dr. Brindley	2	10.00	9	45.00	0	0.00	9	45.00

It seems that the patterns of usage were relatively similar in those lecturers who used SPVEs, in that ‘representation’ was proportionately the most common function for their SPVEs. Thus where SPVEs are used, it is common at least to make reference to a feature present in the SPVE, yet it is less common to take this reference further than identification. However, at least 6 of the lecturers used the

'demonstration' function more than any other. As 4 of these were from the Phase 2 sample, this difference might be a result of differences in the topics of study which might open up more possibilities for demonstration. This applies, for instance, to the demonstration of cognitive processes in action in cognitive psychology -such as facial processing illusions, as shown in Figure 27. Yet it is also noted that 4 of the Phase 1 sample used their SPVEs for 'demonstration' purposes, so it is evident that it is not simply the choice of topic which determines usage. It is possible that differences might originate from lecturers' own intentions for the use of SPVEs. The next section utilises the lecturer interview data to consider whether this is the case. Before this analysis is detailed, it should be noted that the taxonomy was subjected to reliability checks to ensure the robustness of the taxonomy in terms of subjectivity, as outlined next.

6.3.4 Reliability

Checking the taxonomy for cross-coder reliability was an important process as the understanding of the function of the SPVEs is based on what the individual reads into the SPVE. Therefore categorizing them can be prone to biases in individual backgrounds and prior knowledge. Thus a colleague from the discipline of Computer Science was recruited in order to provide a potentially contrasting perspective. If this coders' judgements were similar to mine then, there could be more confidence that the taxonomy is an adequate tool for identifying the functions.

The definitions of the categories outlined in Table 19 were provided to the second coder, along with a randomly selected 10% of the slides that include an SPVE, with their corresponding speech sections. As 216 SPVEs were included in the lectures in both phases of research, the 10% sample would include 21 slides, which equates roughly to one randomly selected SPVE slide per lecturer. Owing to the occasional

use of multiple SPVEs per slide, this resulted in the checking of 24 SPVEs in total. The coder was asked to read the speech section accompanying the SPVE and judge for each whether or not the lecturers' usage appeared to fit into any of the 4 categories provided, and, where it did, to code it as such. It was also requested that any discrepancies in their coding were explained and also that observations about uses which did not fit any of the categories were reported.

Once this coding had been completed, the codes for the SPVEs were compared to the codes given to the same SPVEs by myself. It was found that for the 24 SPVEs scrutinised in this way, coding coincided on 22 occasions, or 91.66% of the time. An interrater reliability analysis was carried out on this data using the Kappa statistic to determine consistency amongst the two coders. The interrater reliability for the coders was found to be in substantial agreement; Kappa = 0.874 ($p < 0.001$). Where coding disagreed it seemed to be due to differences in experience with the subject in question, for instance, whether or not a psychological term was represented in the SPVE. It seems that prior knowledge had a slight influence on whether or not a meaning was interpreted in the SPVEs. Nevertheless, it was concluded that the taxonomy provides a sound appraisal of the functions of SPVEs in the two samples, yet it should kept in mind that interpretation might be influenced by viewer experience.

6.4 Lecturers' declared use of SPVEs in slide-lectures

A thematic analysis of the lecturer interviews was carried out to uncover the lecturers' own accounts of SPVE use. Responses to questions such as 'what do you use images and photographs for?' or 'what is the role of images or photographs in your lectures?' were initially grouped according to the specific reasons given. Once

all of the interview data had been grouped in this way, the overarching themes for the groups were scrutinised for any apparent conceptual links between them. For instance the responses ‘to decorate the slide’ and ‘to make the slides look interesting’ were grouped together. This grouping revealed some general motivations behind the inclusion of SPVEs into lecture presentations. However, since the interviews discussed SPVEs in general, rather than specific SPVE usage, these groups are not mutually exclusive and often lecturers discussed more than one usage and therefore multiple intentions for their SPVEs.

One lecturer, Dr. Brindley, claimed that her usage of SPVEs was informed by PechaKucha, an approach to PowerPoint presentations given within a particular presentational structure, which advocates the use of SPVEs rather than text based representations. However, it seemed that this did not impact on the way in which these SPVEs functioned during the lecture, i.e. this approach did not invite any unique practices of integration. The categories of lecturers’ intentions generally matched with the taxonomy of functions, as described in the following sections.

6.4.1 Decoration

Of the 8 lecturers interviewed, 6 claimed that their use of SPVEs was often aimed at ‘breaking up’ the slides or the lecture itself. In this way SPVEs were used to either decorate or to provide a bit of variety into their slides, to prevent the slides being too text based and therefore ‘boring’. The two lecturers below considered text to be dull, and SPVEs to be the solution:

> I mostly use images to make it look less dull. Because I think a lot of text’s just dull. (Dr. Brooksbank)

> I use them to add a little bit of interest, because I think that a succession of textual based presentations is a bit tedious. (Professor Morledge)

This avoidance of 'dull' slides might be based on conceptions about the aesthetics of slide-lectures, which may lead lecturers to make the slides more visually attractive. When Dr. Cullis was asked why she used SPVEs, she replied:

> I think sometimes they're there to vary the look of things, rather than just having the same slides, you know the yellow background the black writing, it's like 'ooh there's a picture'. (Dr. Cullis)

In making slides more visually interesting or attractive, it was reasoned that lecturers could help prevent their students from becoming disengaged from the lecture:

> I use as many images as I can, because there's nothing more likely to cause eyes to glaze over than a slide that has nothing but text. (Dr. Wormall)

One lecturer even spoke about his experiences in attending other people's lectures and talks, and experiencing the same disengagement. In talking about his usage of SPVEs, he argued:

> It breaks up the monotony of the slides. There's nothing worse than somebody with a dark background and you know, dark

> blue wavy background with gold letters on and you just think
>
> 'Christ I have no interest in what it's about'. (Dr. Silcox)

Thus the use of SPVEs might be aimed towards engaging their students' visual senses, in order to prevent them switching off.

6.4.2 Representation

Although representation was identified most often in relation to the lecturers' usage of SPVEs, the extent to which this function was included in their intentions for use was surprisingly little. One lecturer explains her usage of an SPVE which seems to be a representational usage:

> A couple of weeks ago we were doing stuff on Vygotsky and sociocultural theories of development and all of this. I had to tell them about lots and lots of terminology in terms of intersubjectivity, and all of this scaffolding and how eye gaze is important, and just for something like that, I could just give them text, but I made sure that I threw in an image there. It was just a really close up image of a child's face, where the eyes are looking over this way, and if nothing else, if they can manage to associate the image of the eye gaze with the intersubjectivities slide heading, then they're half way to remembering the rest of the stuff. (Dr. Wormall)

Here the lecturer talks of 'throwing' in an image, which presumably was not integrated in such a way as to make it 'demonstrational'. Indeed she reasons that 'if' her students can associate the image with the concept then it might help. Thus the

SPVE use would be assumed to be ‘representational’, in that it was intended to be associated with the concept. However, there were no further mentions about SPVEs being used for representational purposes.

6.4.3 Symbolism

Although only one of the lecturers in the sample utilised SPVEs for an explicit symbolism function, three of the lecturers spoke of using SPVEs as a symbol for another concept. For instance Professor Morledge explained his use of the ‘Terminator’ photograph as a means of symbolising the underlying theological debate in psychology. Additionally, he explains his use of another photograph used in his lecture:

> What’s coming up in the one fairly early on is an image of one of the nineteenth century Antarctic discovery vessels, to make the point that some of the drivers in the development of science and biological science were actually commercial. (Professor Morledge)

Here the lecturer speaks of showing an image of a ship, not to represent ‘ships’, but to symbolise the commercial intent of exploration. Indeed this is the function that was observed in the lecture for this photograph.

Another lecturer described his usage of photographs of two key researchers, Kahneman and Tversky in his observed lecture as a means to show students that these researchers were ‘just normal people’. His reasoning for this was that these photographs could be used to illustrate the human context of psychological research:

> I had an RA, a good few years ago now, and I introduced him to somebody famous, and he was petrified. And it was because he had elevated this person to some godlike status, when in fact academics, even the Nobel Prize winning academics are just normal people. Who go to the pub and grump about the bins being taken out and stuff like that. And so it's sort of about humanising really clever people. (Dr. Millington)

In this way, the lecturer might use SPVEs as a token which can represent a different concept to the one obvious in the element, or a stand-in for something which might not be so easy to represent in a SPVE. However, it is interesting that although Dr. Millington mentioned this usage, it was observed that he did not make this explicit through the use of these SPVEs in the lecture itself. Thus the intention was labelled 'symbolism' rather than 'explicit symbolism' as identified in the observed usage. This case is interesting as it highlights that although lecturers might intend for their SPVEs to be symbolic, they do not necessarily make it explicit.

6.4.4 Demonstration

When asked about their use of SPVEs it was common for lecturers to mention specific SPVEs which they use to 'show' or 'demonstrate' concepts. For instance, Dr. Wilson, who used SPVEs for 'demonstrational' purposes on 14 occasions, explains one use of SPVEs for this aim:

> I put up a picture of the argentine lake duck that has a 42 cm penis. Which is to highlight levels of processing in memory. (Dr. Wilson)

Here, the lecturer uses an SPVE to 'highlight' the levels of processing concept. He explained that his usage of this SPVE would integrate the SPVE in order to explain why it is relevant to the concept.

Of those that spoke of the 'demonstrational' SPVEs uses in their observed lecture, Dr. Cullis mentioned an SPVE which she wanted to use as visual evidence of Harlow's monkey experiments:

> So if we can try and put some pictures in, like the Harlow's monkeys, I think that helps if you can, it's not a great picture, but you can see this kind of monkey clinging onto this horrific looking towelling metal thing. (Dr. Cullis)

Here the lecturer intended to demonstrate the horrific nature of the experiment. However, when this SPVE was examined in the lecture transcript, it was identified as 'representational'; the horrific nature of the experiment was not mentioned or highlighted. Again, Dr. Brindley describes her decision making process in relation to two SPVEs which she wanted to use to demonstrate the impacts of positive and negative features on impression formation.

> With the positive and the negative features, when I initially thought of it, I was like, ok so a positive, I immediately thought 'features' and 'noses', and so I had a nice nose and a horrible nose, and that was my positive and negative features. And I was actually thinking that's not really capturing the impression formation thing, and actually, what it's like to be as a person. So I

> thought about the good fairy and the bad witch thing, which might be a better mental image to fit what I was saying. (Dr. Brindley)

Yet although she talked about two SPVEs as being demonstrational of positive and negative features, no mention had been made of the features or her intentions for including them during her observed lecture, thus they had been identified in her lecture as 'decorational'.

All of the lecturers mentioned 'demonstration' of concepts as their intention for SPVEs. However, where *specific* SPVEs used within the lecture were mentioned during the interview, their explanations of their usage of these SPVEs did not always match their observed usage during the lecture.

Overall, the categories of intentions could be matched to the taxonomy of identified functions. Thus these lecturers intend to use their SPVEs for 'decoration', 'representation', 'symbolism' and 'demonstration'. However, in explaining their intentions for specific SPVEs, lecturers often claimed that the functions were different to what was identified from their observed usage. It appears that lecturers might be assuming that their intentions for their SPVEs are obvious to their students, and so do not need to explain them, or else that they expect their students to do the cognitive work needed to uncover the lecturers' intentions. Therefore, it is important to consider how students react to SPVEs to examine whether they understand when they should be doing anything with the SPVE.

6.5 Characterising the students' experience of SPVEs

Before examining student reflections in general, it is worth examining a particularly interesting case from the focus groups. By a happy coincidence, during

one particular focus group, I had not been able to show the lecture video to students owing to technical difficulties. Also there had been a problem when printing the handout, resulting in a slide handout in which the text was unintelligible, but the VEs remained unchanged. For example Figure 29 shows the slide as it was intended, along with how the slide was printed:

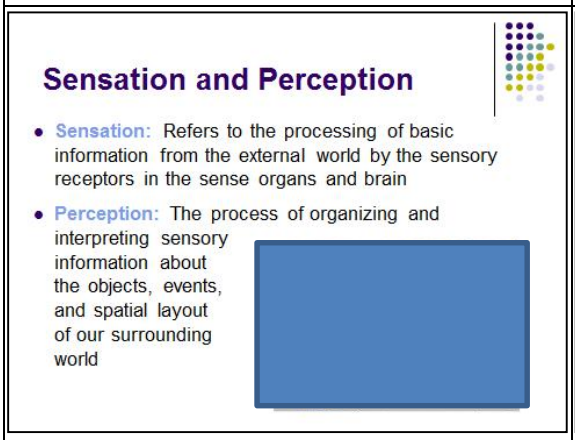
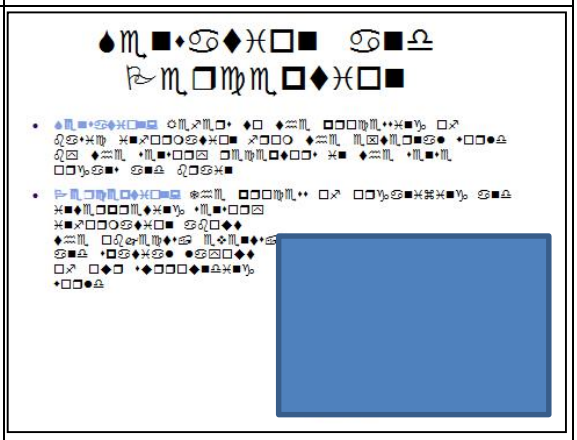
Intended slide	Printed slide
	

Figure 29: Example of ‘normal’ and ‘obscured’ slide used in the focus group interview with students of Dr. Wormall

This arrangement meant that during the focus group, students could not read the topics from the slide, but they could utilise the SPVEs to prompt their recollections. Below is the lecturers’ speech which accompanied this slide:

> So you’re going to be doing a lot more sensation and perception in later lectures, but as a reminder, the basic distinction is that sensation just means that the basic stuff in the world is being picked up by the body. So this is about the raw signals that are coming in. The fact that light waves will be picked up by the retina, the fact that temperature is sensed by conductors on the

> hand. Perception is different. Perception is when you take this mass of sensory information and we make sense of it. We bring it to a point where we know that that thing you see on the desk is an apple. Or you can pick something up and you know that this thing is warm. So its perception that things will actually meet the level of being a recognisable something.

This photograph is considered to be 'decorational', as there is no explicit link between the photograph and what is said. Although the photograph may have been intended to represent the concepts mentioned, for instance humans sensing and perceiving things in their environment, the lecturer does not verbalise this. The students, then, are not given an explicit agenda for viewing the photograph. However, when students were shown the above obscured slide in the focus group interview, one student said:

> 'Oh I remember it was something to do with perception, sensation, so like your senses. Your perception and to do with the apple, so how the baby looked, felt the apple, and the colour and everything. Because I could see the baby, high chair, and the feeding and so that's what I got' (Susan, Dr. Wormall's lecture)

What was interesting was that there had been no mention of the photograph in the speech, or of feeding a baby in a high chair. However it seems that the student had been engaging with this photograph during the lecture and assimilating her own interpretations with it to create a personal understanding. Thus a lecturers' 'decorational' photograph performed an entirely different function for the student. However, the example below highlights the problem such engagement might cause:

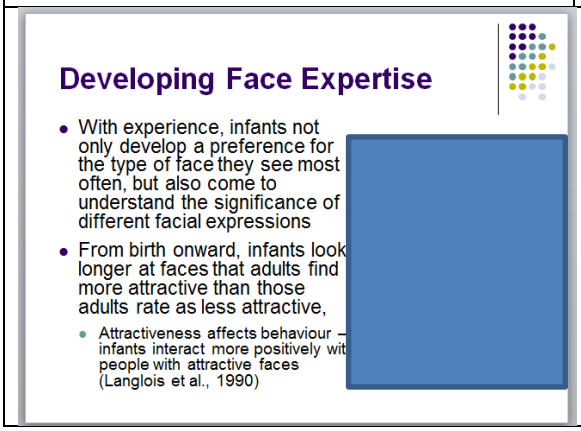
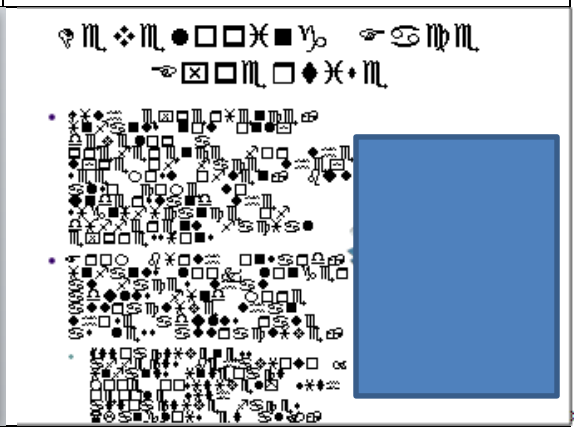
Intended slide	Printed slide
	

Figure 30: Example of a second obscured slide used in the focus group with Dr. Wormall

This slide was about face perception: how infants are able to, very quickly, learn how to tell emotional states from faces, and will also develop preferences for attractive faces. Whereas when asked about this slide, one of the participants replied:

Anna: It's how the babies take about, I think 12 consecutive or 12 cumulative hours to actually remember its mothers face. So that could be a few days or even up to a week

Interviewer: How are you remembering this? There's no text there, but what are you using to bring back the memory of it?

Anna: Just the picture. No just the picture. I don't know I'm weird; I really like pictures so the moment I saw it, it

> reminded me of a hospital, and the mum just sort of delivering the baby. (Student of Dr. Wormall)

The student spoke of associating the hospital connotations of the image with a new-born baby and its relationship with its mother, and thus spoke about how the lecturer had said it takes 12 cumulative hours for infants to learn to recognise their mothers face. This fact was actually spoken about on the previous slide which had its own very different SPVE along with it. The SPVE was clearly a good tool for her to anchor her memories onto, but it is arguably the wrong SPVE to do so. This might not pose a major problem for learning because, undoubtedly, the student had a good understanding about the '12 cumulative hours' concept. Yet had this image been intended to perform some other function, then the opportunity for engagement with that function appears to have been lost. It seems that if a lecturer does not integrate the SPVE, there is any number of ways that they can be assimilated into the students' story following the lecture. Clearly it is difficult here to examine whether the student was making the 'correct' associations for the SPVE *during* the lecture, which would be an interesting avenue for further examination. Nevertheless, although not always detrimental to learning, it is wholly possible that mistakes can be made in assimilating the SPVE with the lecture information, meaning that students may take away the wrong message, or at least not the message intended for the SPVE by the lecturer. Indeed, it was noted by these students that SPVEs might invoke a daydream situation during the lecture, in which the student 'drifts off' to think about the meaning in relation to their own experience:

> Sometimes these images that they use; they could sort of make you drift off to another world! Where you're not supposed to

> because they just triggered off some sort of, I don't know, a little experience that you had, and I mean, I understood her point, but I went to my sister's baby, 7 month old baby and was thinking about her in hospital and everything else. (Susan, Dr. Wormall's lecture)

Here, seeing the 'hospital' SPVE triggered a memory about her sister's baby which meant that she was not necessarily attending to the lecture at this point. Although this might be considered to be beneficial, as it indicates that the student was having some personal engagement with the lecture material, it is not guaranteed that the engagement will be suitable for the instructional intention of the SPVE. Thus students might be engaging with SPVEs used by lecturers during their lecture, leading to potentially beneficial results. For instance the students here clearly had a meaningful engagement with the SPVE and associated the SPVEs with some of the lecture material, if not the intended lecture material. However, if the lecturer has specific intentions for the SPVE, and does not make them explicit, then the student might be mis-associating lecture material with the SPVE, and therefore their engagement is misplaced.

It is important then to consider how students might be reacting to SPVEs during the lecture in order to consider the extent to which they offer the potential for meaningful teaching and learning opportunities. The strategy for a consideration of the students' reaction to SPVEs involved examining the extent to which they invited note-taking, before examining the functions that they identified.

6.5.1 Note-taking and SPVEs

The students' note-taking practices in relation to SPVEs was compared with the observed function of the SPVE in the lecture, in order to consider the extent to which differences in the lecturers treatment of SPVEs might invite any different practices. Examining the notes made in relation to SPVEs involved identifying the connection between the note or 'chunk' of notes and the SPVE.

As mentioned in Chapter 5, (section 5.5.1), the connection between note and slide was decided by considering the content of the chunk of notes, in relation to the transcript. This could primarily be identified through considering whether the information in the note was a clear attempt to point to the information in the information in the slide handout, by using arrows such as the example below:

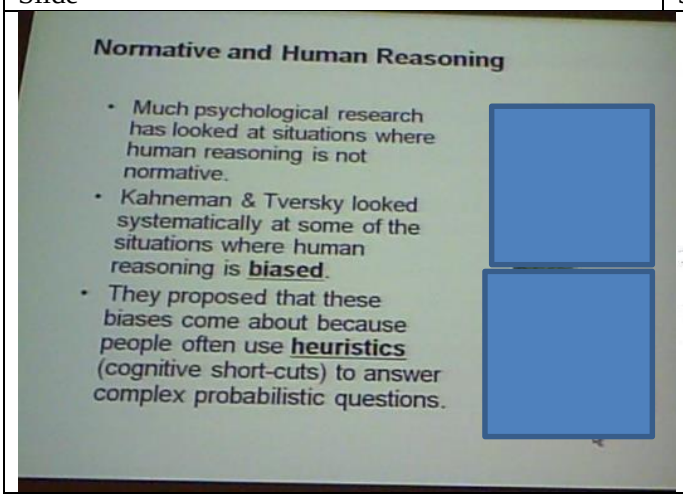
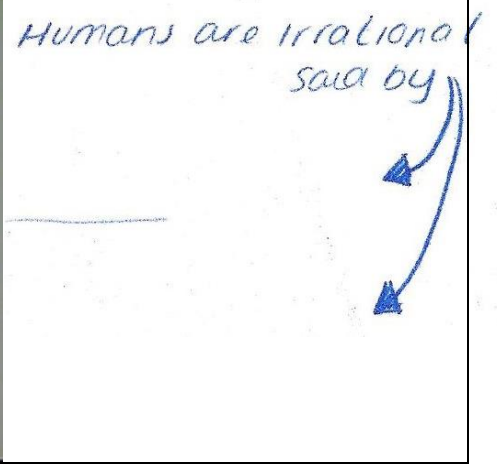
Slide	Student note
	

Figure 31: Example of labelled photographs

Here the lecturer had said that the two researchers represented in the photographs had claimed that humans are fundamentally irrational, so it was clear that the student was noting this in relation to the two photographs.

Additionally, when the note could not be linked to any information in the slide-text, the SPVEs were consulted to establish whether there might be a match. In the example below, the information noted appeared in the lecturer's speech which made reference to the SPVEs in the slide, but not to any text on the slide. The lecturer referenced the concepts represented in the photographs as being 'age', 'ethnicity' and 'class', so the student's note which includes these labels can be considered to be connected to the SPVEs.

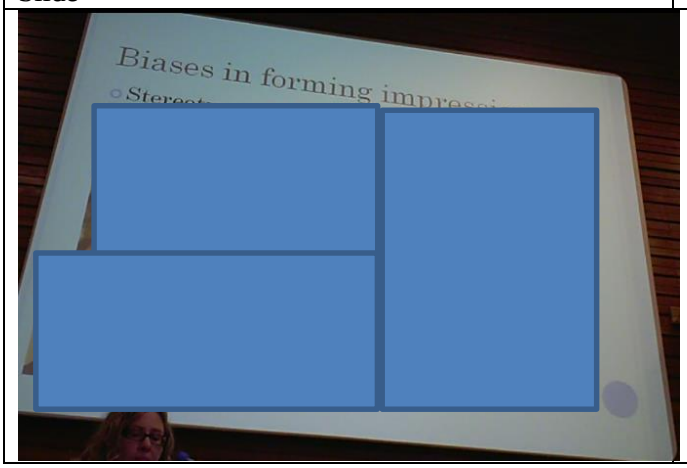
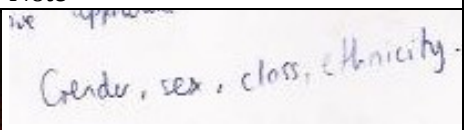
Slide	Note
	

Figure 32: Example of notes made in connection with photographs

Thus where the information was contained in the lecturers' speech and also in an SPVE, it was coded as being connected to an SPVE. When the notes were identified, the number of notes made in relation to each SPVE were compared with the SPVEs' identified function in the lecture. These figures are represented in Table 22 below. It seemed that 'decorative' SPVEs did not invite any notes, whereas 'representational' and 'demonstrational' invited the most.

Table 22: Table showing note-taking in relation to the function of SPVEs

SPVE type	**Identified function in Lecture**			
	Decoration	Representation	Explicit	Demonstration

			Symbolism	
Image	0	5	0	10
Photograph	0	7	1	6

Although these were very small numbers of notes, it does suggest that students might be able to identify how the lecturer is using their SPVEs, and adjust their note-taking practice accordingly, with 'decorational' SPVEs inviting the fewest notes, and 'demonstrational' inviting the most. Thus note-taking in relation to SPVEs is thought to be potentially related to the extent to which the lecturer integrates the SPVE. However the sample sizes of notes taken in relation to SPVEs is too small to enable an in depth examination of this relation. Therefore it is important to consider what students regard to be the function of SPVEs, as this understanding might reveal the extent to which SPVEs can be beneficial in slide-lecture pedagogy.

6.5.2 Students' functions of SPVEs in slide-lectures

Student focus group interviews were analysed using the same technique employed for analysing the lecturer interviews, i.e. coding and recoding to distil the emerging themes. This allowed an insight into the reactions that students had to SPVEs in general. Two of the student functions of SPVEs did not match with the functions identified by the lecturer and observed functions of SPVEs. Rather they appeared to reflect more cognitive functions.

6.5.2.1 Anchor for memory

When students were asked specific questions about information covered in the lecture, some students utilised the SPVEs as a reminder to help them to answer. For instance, after Dr. Cullis' lecture on Attachment and Deprivation, students were asked what Tizard was looking at. One student remarked:

It's the orphanage slide, because it had pictures of toys on

(Student of Dr. Cullis)

Here the toys had functioned as an anchor for the information about Tizard which was spoken about during the lecture. Other students spoke of information in terms of what slide it was on, depending on what type of SPVE had been shown on the slide. For instance by responding 'it was the hospital one' where a photograph of a man in scrubs had been used (Dr. Wormall) or 'it was the Dolly Parton one' where a photograph of the singer had been used (Dr. Wilson). Indeed, students suggested that SPVEs can often be the things that spark off a memory for a topic spoken about in a lecture.

Interviewer: So Leanne, you said pictures are good, what was it about pictures that are good?

Leanne: Triggers memories doesn't it. Vision, sensation and stuff.

Beth: And also pictures really help, because I can then relate it to something and not feel like it's just a lot of words, do you know what I mean?

(Students of Professor Morledge)

In this way, the SPVE might be used as a form of anchor for the student's memory; they associate or relate the topic with the SPVE. This might be over and above the association that is possible in using text representations. Indeed one student

found that the process of completing the focus group interview had helped her to realise how much had been remembered by focussing on the SPVEs on the slides:

> I mean it's really amazing, I just realised how much I was able to remember, from, just by the fact that it's an image, it sort of triggers loads of different areas or concepts and stuff that you were, sort of ideas that you were thinking about at that time. And then you think 'oh I remember that' and you've actually stored quite a lot of information there. (Student of Dr. Wormall)

It does seem that SPVEs might offer students an aid to their memory for certain information. SPVEs were generally considered to be useful in helping students to remember concepts, or as a visual anchor to associate with topics covered in the lecture. Students also recognised that SPVEs might help in managing their attention.

6.5.2.2 Capturing attention

Students cannot be expected to be alert and attentive to the lecture throughout the entire lecture period. Their attention might wander at any point. However students noted that where a SPVE had been included it helped to bring their attention back to the lecture once they had 'zoned out':

> Anna: I'm like a child! Children zone out and then something interesting visually happens so I get…
>
> Susan: Don't worry, you're not alone! I get like that as well. Or suddenly if a different slide comes up with different images and sort of, you know start looking

> at it… My attention, I think immediately draws towards the image. (Students of Dr. Wormall)

Here the students recognised that a change in visual information might help them to recover their attention. Thus it is possible that SPVEs might function in an attentional capacity for students. Moreover, the change in visual stimuli and its impacts on students' attention might provoke the student to question the presence of the SPVE on the slide:

> Mark: Little things like the Dolly Parton thing as well; even if you are zoned out you can like look at the screen and think what is he on about? Why is Dolly Parton on the screen?
>
> Jane: It makes you think what is going on? Why is Dolly Parton on a psychology slide?
>
> Faye: Yeah, if you've zoned out and you literally start seeing things, you're like, hold on what's going on? You're kind of instantly back again and you're paying more attention. (Students of Dr. Wilson)

Here the students' confusion at seeing Dolly Parton in a lecture in psychology not only gained their attention but may have even led to them trying to guess why Dolly Parton was included, therefore having an engagement with the material. Thus especially where SPVEs are unexpected, they might play a role in capturing the students' attention to the lecture and, through this, prompting an engagement. This seems to be over and above the attention that lecturers spoke about when describing

the ‘decoration’ function. Rather this attention functions to draw students into some kind of interaction with the SPVE.

6.5.2.3 Representation

Finally, students recognised the ‘representational’ function of SPVEs: i.e., that the SPVE might be an alternative representation of what is being spoken about or what was in the text. When the following student was asked why she paid attention to the SPVE before the text, it was reasoned that the speech would be covering the topic of the text anyway, so there would be no need to read it. Rather, the student preferred to look at the SPVE first because it is a representation of the topic being covered in the speech:

> I think it’s firstly the image, because she’s already talking, so you already kind of get a jist of what’s going on. And then the image will represent what she’s talking about, and then you’ll go on to reading it. (Student of Dr. Wormall)

Furthermore, it might be that students consider that SPVEs along with the speech might perform representation functions more efficiently than does text with speech:

> It’s visual and then it’s auditory, and the two sort of go together. And it’s not taking too much and it’s not overwhelming, if you know what I mean. But just text and then listening, it’s just too much. (Student of Dr. Wormall)

Whereas this student did not like the combination of text and speech, the combination of SPVE with speech made the information easier to process. The

'representational' SPVEs used by lecturers might be being interpreted in the same terms by the students; the SPVE represents a concept appearing in the text. For the student though, this means that they do not need also to read the text, thus potentially solving the problem of reading and listening simultaneously.

However, it should be noted that the lecturer had used the photograph of Dolly Parton for 'demonstration' of a concept, whereas it had here been spoken about in terms of its function in capturing attention by students. Further, it was noted that the 'hospital' image had had a 'decorative' function in the lecture it appeared in, yet students understood it as an anchor for their memory. What is interesting is that when they talked about specific SPVEs, students clearly did not always recognise the function that lecturers invoked. It seems that students do not reliably identify their lecturers' specific usages of SPVEs, but may instead assign different functions to them.

Yet in considering their reflections on these representational functions, students noted that SPVEs have possibilities for aiding cognitive processes in slide-lecture situations, and may even perform pedagogically beneficial functions over and above the functions of text. That students might be assimilating the SPVEs into their own understanding without prompting by the lecturer is interesting. Furthermore, that students were questioning why specific SPVEs had been displayed suggests that SPVEs might prompt the kind of personal engagement advocated in this thesis. Yet the manner in which this happens is rather erratic and irregular, it seems to leave much to chance. Further, what are the consequences if this assimilating of SPVEs ends up giving students the wrong understanding? It is necessary here to turn back to the overriding question for the chapter: can slide-lectures be creatively re-mediated

through the use of multimedia (specifically SPVEs)? The next section will do so through discussing the findings of the analyses.

6.6 Discussion

This analysis initially examined the usage of SPVEs, then considered SPVE use from the lecturers' point of view. Discussions with lecturers who used SPVEs during the lectures that were observed revealed that there were a number of reasons for using them: namely, providing something interesting to look at (decoration), including SPVEs that represented the topics spoken about (representation), using an SPVE as a symbol for a different concept (symbolism) and, finally, using the SPVE as visual evidence of a concept (demonstration). Yet the most common usage was as the representation of a topic.

From the student's perspective, SPVEs were found to perform two further functions which potentially facilitate their ability to engage with the lecture material: as a means to 'anchor their memory' and as a means to 'capture attention'. However it is unclear from this analysis whether this engagement led to the kind of learning outcomes intended by the lecturer. Nevertheless, the analysis revealed that SPVEs might offer an interesting avenue to engagement in the slide-lecture experience. This discussion will outline the implications of these findings in relation to established knowledge about the role of SPVEs in pedagogy.

6.6.1 The importance of the function of the SPVE

The 'decorational' and 'representational' functions outlined in 6.3.3 and in Carney and Levin's (2002) typology are not intended to be equivalent categories. Rather, my categorisation considers how they have been used in relation to speech as opposed to their use in relation to texts. However, they do overlap to some extent.

Namely, that an SPVE placed in the 'decorational' category is not addressed by the speech or text in order to reference its meaning. Further, the 'representational' SPVEs are used to visually represent something appearing in the speech or text. The key part of my categorisation is that these are either not integrated into the speech, or else are only integrated at a superficial level, i.e. mentioning the features present. Although these usages seem to reflect the potential of SPVEs to reduce processing demands, as suggested by the CTML, the problem here is that these 'decorative' and 'representational' SPVEs are not controlled by the lecturer to fulfil their aims if they do not take this integration further.

That lecturers might not make their intentions surrounding SPVEs explicit is significant, considering that classification of the function of the lecture SPVEs was carried out without the knowledge of how lecturers had intended to use them. This 'blind' coding is methodologically important, as it allowed the adoption of the student's point of view when judging SPVE functions. As I did not always know what the lecturer had intended to do with an SPVE, I had to place myself in the students' position in order to work it out. Again, I was afforded the luxury of time to perform such identification, while students have a much more limited time frame for the same task. So, the time element might be responsible for the discrepancy between the students' identified functions and the lecturers' functions of SPVEs.

However, it was difficult to tell beyond a few examples what lecturers intended with each SPVE and whether it was achieved. It was not intended here to discuss each instance of SPVE use during the lectures and, furthermore, such an examination would have placed too much emphasis on SPVEs during the interviews. Yet in some cases, lecturers spontaneously referred to specific SPVEs that they had (or were going to be) used during the lecture. For instance, Professor Morledge spoke

during his interview about his intention to use the 'Terminator' photograph as a symbol for the concept of psychological reasoning and, indeed, this was how the photograph was integrated during his lecture. However, it seemed that in discussing specific SPVEs, some lecturers mentioned functions that were not reflected in their observed practice involving those SPVEs. For instance, they might intend for an SPVE to provide an additional representation of a concept/object etc., yet their integration (or non-integration) of it might identify it as a 'decorational' image, if they forget or otherwise neglect to make reference to it. It is clear that lecturers might have specific intentions for their SPVEs which are not communicated during the lecture.

In terms of the students' perspective, they identified only 'representation' out of the functions outlined by lecturers, but also identified some cognitive functions of SPVEs. Students viewed SPVEs as a memory aid, and also as a means to capture their attention if for some form of interaction with the SPVE. Thus students seemed to regard the facilitation of lecture processing as an overriding function of the majority of SPVE uses. This facilitation of processing might be true for 'decoration' and 'representation'; however it can be argued that 'symbolism' and 'demonstration' are intended for more cognitively intensive uses. These categories of use demand that students process the SPVE in a different way. 'Demonstration' is a particularly interesting category in this respect, as it demands that students pay attention to specific aspects of the SPVE and assimilate the speech to that aspect in order to understand a concept. Of course, the discipline of psychology, and specifically the cognitive strand of this discipline lends itself easily to such demonstrations. Thus it is possible that this disciplinary effect was responsible for the prevalence and spread of 'demonstrational' SPVEs in the sample. Nevertheless, students here took slightly more notes in relation to 'demonstrational' SPVEs which might show that students

identified the special nature of the SPVE over and above 'representation' of the concept. However, the small sample of notes taken in relation to SPVEs leaves little confidence in the suggestion that students might treat 'demonstrational' SPVEs differently to others. Thus the extent to which the 'demonstrational' use of SPVEs invites different note-taking practices remains open for examination.

The importance of this discrepancy between how students and lecturers understand SPVE functions is that the students mentioned questioning the SPVE if it had captured their attention. If such SPVEs are being questioned, and their meaning not revealed by their lecturer it is possible that the students' interpretations might lead to their attributing a different meaning to the SPVE. Watkins, Miller and Brubaker (2004) examined the accuracy with which high school students could interpret different images in science textbooks. A selection of images classified within Duchastel and Wallers' (1979) categories of 'illustration', 'descriptive', 'constructional', 'functional', 'logico-mathematical', 'algorithmic' and 'data display' (cited in Watkins et al., 2004), were selected from a set of science textbooks. Students were allowed to read the text explanations of the images before being interviewed about their interpretations of them. It was found that, in the main part, students could not identify the correct interpretation of the images, according to the authors. Further, they found that 63.7% of students constructed their own explanations of the images, rather than utilising the explanation given in the text. These explanations were often incorrect and inaccurate in terms of their scientific foundations. It was concluded from Watkins et al's research that images in science textbooks are not used correctly by students, and as such may even lead to misconceptions about science.

Considering the findings of this chapter, it is possible that when students miss the lecturer's intended meaning for their SPVEs, or the lecturer does not explicitly

identify it, those students may attempt to create their own meaning – which may be misleading. However, Watkins et al's research was based on textbooks in which SPVEs are usually accompanied by a caption, or at least some explanation of its presence. Yet research by Schwartz and Collins (2008) reveals that SPVEs might have the ability to influence learning even if they are not explicitly integrated through such captioning. They carried out an investigation into the extent to which different images influenced the position that students took on a 'controversial issue', in this case safe sex. In this study, students with different cognitive styles were considered: that is, 'field-dependent' (using a global processing approach) and 'field-independent' (using an analytical processing approach). They were presented with a text accompanied by different SPVEs which each depicted a particular theme. Through analysing position statements written by the different groups of students, it was found that the theme of the SPVE can particularly influence 'field-dependent' students' positions in relation to the safe sex message. For instance, 'field-dependent' students who saw a romantic themed SPVE made more statements in favour of safe sex. Importantly, the text remained the same for each of the different types of SPVE. Thus it can be assumed that the text made no specific mention of the SPVE that accompanied it in this study. Added to the observations from my analysis here, it seems likely that SPVEs in slide-lectures can influence students' processing and understanding of instructional material *even if it is not explicitly mentioned or integrated with the speech.*

It is clear that the slide-lecture which employs SPVEs allows a diversity of interpretative acts on the part of the lecturer, and therefore the students' meaning making processes in relation the SPVE are potentially rather conditional. This conditional experience might reflect differences in both the lecturers' integration and

in the student audience, for instance in culture, visual literacy, and in their interest in visual representations. Further, it must be acknowledged that in using an SPVE in a lecture, unless it is created specifically for the lecture, the use of the SPVE is removed from the original author's intention for it. Indeed, in writing about semiotic readings of images, Sless (1986) points out that the author's reading of an image is never the same as the viewer's (cited in Jin, 2010). For instance the photographers who captured Harlow's monkey experiments may have intended to simply capture the scene for posterity, whereas Dr. Cullis intended to use one of the photographs to show the 'horrific' nature of the experiments. Therefore the lecturer introduces another level of meaning to the SPVE, which may or may not be apparent to the student. It is wholly possible that the student will also read the 'horrific' nature from the SPVE, but on the other hand, they might assume it has been included to only show them the scene objectively. Thus if students attempt to make sense of the SPVE *itself* rather than its *function* in the lecture, the potential for them to be misled is increased. It seems important that lecturer intentions for SPVEs are made explicit where the goal is for the student to take a specific reading from it.

Of course it might not be the lecturers' intention for their students to share their own readings of SPVEs in lecturers. In not integrating their SPVEs then, lecturers might be providing students the opportunity to come to their own understanding of the SPVE's meaning within the lecture. Bearing in mind how SPVEs are processed (see section 6.1.1.1), it is entirely likely that students will take up such opportunities. However, it is clear that lecturers should not assume that their students will engage in such work without prompting, and even if they do, that it will lead them to the intended learning outcome. Further, if such reflection amongst students was the goal of the lecturer, then it seems that the reflection would be worthy

of further exploration within the lecture itself by means of interaction and discussion, rather than comprising a fairly transient aspect of the lecture. If the students' reading of the SPVE goes unprobed, they may well take away an inaccurate understanding. It is clearly worth questioning what SPVEs might offer to slide-lecture pedagogy.

6.6.2 What can be said about the potential of creatively re-mediating the slide-lecture through the integration of SPVEs?

It might be said that the SPVE-speech combination does offer an engaging and less cognitively demanding model of instruction than the text-speech one. However, when considering the students' identified uses in relation to the more pedagogically constructive functions, for instance 'demonstration', it is entirely possible that they might miss the lecturers' intended function if it is not made explicit. Indeed there was no recognition of 'symbolism' and 'demonstration' within students. Although lecturers might have particular aims for using SPVEs; students might not recognise these, or might only recognise them if the lecturer explicitly does something with that representation. Thus, as students do not usually have time, or indeed the incentive, to consider carefully what the SPVE might be being used for, they may instead simply outline the function that seemed most obvious to them; to ease their processing.

The aim for this chapter was to consider the question: can the slide-lecture be re-mediated through the integration of multimedia to encourage engagement? Through focussing on SPVEs in particular, it was found that SPVEs have the *potential* to provide an engaging lecture experience, even if they only serve to reduce the demands of a speech + text processing situation. It seems that by just showing SPVEs to students, the least a lecturer can do is give a visual context to anchor information. However, either lecturers are not being explicit enough in their integration of SPVEs, or else their tendency to *not* integrate SPVEs might be sending

the message that students do not need to pay attention to SPVEs over text representations. In the current slide-lecture model then, SPVE use appears to be secondary to text in both the lecturer's integration and the students' lecture practices.

Yet this analysis has revealed that students might pay attention to SPVEs over text and speech as they are more attention capturing, even if this attention is fleeting. It is possible that students in a lecture might be processing and engaging with SPVEs appearing on the lecture slideshows even if the lecturer does not make any particular mention of them. Potentially then, students might be led astray by SPVEs as their meaning in the context of the lecture is difficult to establish without some acknowledgement from the lecturer. Admittedly the functions can and indeed are often achieved by speech and text alone, meaning a SPVE isn't necessary. But it is also possible that students might miss this analysis in relation to text, as they are too busy writing down the slide-text or annotating their handout. Thus the potential benefits of SPVEs over text might be simply that, if they are considered as a replacement of text, they negate the inefficient practice of copying or otherwise focussing on text. Yet if lecturers have a clearly defined purpose for using SPVEs and they integrate them explicitly in their lecture, there is the potential for SPVEs to create a meaningful learning environment for students.

The next chapter examines the findings of the three analytical chapters, together with the aims of the research, in order to consider what can be said about the nature of the slide-lecture and the implications for the creative re-mediation of slide-lectures. Following this, Chapter 8 will outline the conclusions of the research, and whether the intended contribution to knowledge has been achieved.

Chapter 7 General discussion: the outlook for the slide-lecture

7.1 Introduction

The previous 3 chapters detailed an empirical investigation into the slide-lecture which set out to answer 3 research questions;

1. What are the practices that are employed in integrating slide-text with speech in slide-lectures?
2. What experience do lecturers intend to create in the design of their slide-lectures and how far do they succeed?
3. Can the slide-lecture be creatively re-mediated through the integration of multimedia to encourage engagement?

In examining these questions the aims have been to contribute to knowledge about: the communicative practices employed in slide-lectures; how these practices might impact on teaching and learning; and how they might be creatively re-mediated. Although the findings have been discussed individually in the three empirical chapters, it remains to integrate the findings, and consider them in light of the contexts set out in Chapter 1 and Chapter 2.

This chapter considers the findings that have emerged through empirical investigation of the questions in relation to the context of lecturing in psychology. The discussion focuses on two central themes emerging form the research, arguing firstly that the current model of slide-lectures which provides a text outline of the lecture material is problematic in terms of the communicational practices and study practices employed during psychology lectures. Secondly, it argues that an approach which

makes more use of SPVEs and less of text might provide a promising alternative model of lecturing. However it also notes that much work is needed in order to examine this model in terms of its impacts on the teaching and learning environments that it might create.

The discussion will evaluate the findings of the research in order to establish the barriers and opportunities to teaching and learning that slide-text poses (section 7.4), and also whether an alternative paradigm can be recommended (Section 7.5). Chapter 8 then suggests conclusions which can be drawn from the research and the potential implications on lecturing practice. Chapter 8 also considers the extent to which this thesis has achieved the original contribution to knowledge intended. Before the discussion, it is important to outline the findings once more to specify for the reader what particular issues are under discussion. Therefore the next section provides a summary of the findings.

7.2 Answering the research questions

It was noted in Chapter 2 that the slide-lecture is a distinct form of lecture. Some key factors were discussed which identify it as such, that slide-lectures tend to contain more text than other lecture formats; that they are often accompanied by a slide handout, enable the embedding of multimedia into the presentation and are more practical than OHP lectures. What is lacking in the relevant fields of literature is a description of how this distinct form of communication impacted on lecture based practices. The first research question then was related to the specific practices that this genre of communication involves.

7.2.1 What is the nature of the slide-lecture as a form of communication?

A corpus of 11 transcripts of video-recordings of lectures in 'Attachment theory' was collected from lecturers teaching on first-year psychology courses, in order to examine the extent to which lecturers integrated the text that appeared on their slideshows. Initially it was noted that there are many different types of slide-elements included in slide-lectures, the richness of which is not captured by existing taxonomies of slide objects. Thus a new taxonomy of slide-lecture elements was identified. That many questions were raised by the appearance of different types and combinations of element highlight, initially, that there are many communicational options available to lecturers in the slide-lecture. It was identified that of these options, by far the most common option taken is the use of text, and specifically, the bulletpoint.

Through analysis of the lecturers' integration of the slide-text with their speech, it was found that the practices of slide-lectures involve both explicit and also more subtle means of integrating slide-text, from using direction and demonstratives and repeating text verbatim, to itemizing and mangling the slide-text. Further, lecturers were found to vary significantly in their following the pattern of the slide-text when speaking. Through examining lecturers at the extremes of following of slide-text pattern, it was suggested that there are two characteristic approaches to slide-text integration, or 'relationships' that lecturers can have with their slides. In using the slides as some form of 'referent', lecturers refer to the elements displayed on the screen in order to comment on them, thus separating the speech and slide messages. Alternatively, in using the text as 'scaffolding' for the speech, the lecturer might weave this scaffold into their verbal expositions, thus combining the slide and

speech messages into a single narrative. These relationships might be correlated with the level of integration of slide with speech that the lecturer displays, as the lecturer who scored highly for integration seemed to employ the 'referent' relationship most often, whilst the lowest scoring lecturer employed 'scaffolding' more often. Yet it can by no means be said that the two relationships are exclusive to either end of the continuum of integration, rather it seems that such relationships can be employed to varying extents throughout the lecture.

It can be concluded that the nature of the slide-lecture as a form of communication is one which invites complex and dynamic practices in which the speech points to the slide-text to varying extents. Also it can be said that these practices result in relationships which can be classified as 'referent' or 'scaffolding' relationships. Because of the variation in the extent to which the slide-text is addressed by speech, it is suggested that this situation results in a potentially difficult and confusing experience for students. Moreover, it is suggested that the two different relationships might result from different intentions of the lecturers. However, it is recognised that firm conclusions could not be made about the student experience or about the lecturers' intentions for their communicational practices from this study. Rather the next chapter sought to address these issues.

7.2.2 What are the teaching and learning experiences created by this form of communication

A second study was carried out to collect transcripts of 11 more lectures in undergraduate psychology. This time however, lecturers were interviewed to discuss their integration practices. Additionally, selections of students participated in focus group interviews, and made copies of their lecture notes in order to explore their

experiences of the slide-lecture. Analysis of these interviews and notes focussed on what lecturers and students did with the slide-text and speech streams.

It emerged that the teaching experience in relation to slide-lectures is one in which lecturers' predominantly feel that they have to provide a lecture outline that students can use to revise for their exams. Thus the most obvious way to provide this outline is to display it on slides during the lecture. However, there are varying attitudes towards the extent to which the slides should be integrated by the speech. Their intentions for usage reflected the two relationship types identified, in that lecturers either spoke of the role of their speech to comment on the slide-text (as in a 'referent' relationship), or they identified that the role of their speech was to combine their speech message with the message conveyed in the text on the slide (as in the 'scaffolding' relationship).

From the students' perspective, the slide-lecture is conceived as a means to be provided with the lecturers' outline of the lecture, which shall be explained during the lecture. Thus the students expect that their lecturer will address and explain each element on the slide. Further, it was identified that there are two distinct note-taking practices within these students, either they annotate printed copies of their slide handouts, or they take notes independently. In analysing the origins of the notes, it was found that those who took independent notes predominantly copied the slide-text, and those who annotated sought to supplement the slide-text with information from the speech. This suggests that perhaps the lecturer's relationship with their slides might have different impacts depending on what practices the student employs. For instance, those who copy slide-text might potentially go away with incorrect information if the lecturer disagreed with or contradicted the text during the lecture as in the 'referent' relationship.

In analysing their interview data it seemed that differences in note-taking practices might reflect differences in underlying assumptions about the importance of the slide-text and the speech streams. Either way, it was clear that students expect a highly integrated lecture in which lecturers made sense of all of their slide-text with their speech.

From this study, it can be concluded that there is an underlying understanding that the slides are mainly intended as a means to provide a handout to be used by students as a revision guide following the lecture. However, lecturers and students disagree about the extent to which this guide should be followed by the speech during the lecture. Where students are likely to expect that slide-text is thoroughly integrated, lecturers vary in their willingness to communicate in such a way. Overall though, the slide-lecture creates an experience in which text and its integration is a hugely important player in both the lecturers' performance, and the students' perceptions of their learning. Yet the extent to which it is recognised by both groups as important is unclear. Thus slide-text is considered problematic in terms of its integration.

7.2.3 Can the form of communication be creatively re-mediated through the use of multimedia?

It was reasoned that the focus on the importance of slide-text for both lecturers and students is problematic in terms of the integration of text into the lecture performance. Therefore Chapter 6 sought to examine one alternative paradigm; namely that of using multimedia, specifically photographs and images, or SPVEs. The lecture transcripts, interviews and students notes were revisited, this time focussing on firstly the uses that lecturers made of SPVEs, then the lecturers' justifications for and students' reactions to the use of SPVEs.

Through examining the lecture transcripts, this time focussing on the use of SPVEs, a taxonomy of functionality was distinguished in the communicational practices surrounding SPVEs. This taxonomy consists of four categories each increasing in the extent of exploitation of the SPVE by the lecturer for pedagogical aims. The SPVEs were used for ‘decoration’, ‘representation’, ‘explicit symbolism’ and ‘demonstration’. ‘Representation’ was by far the most common function, followed by ‘decoration’, then ‘demonstration’ and finally ‘explicit symbolism’. Interview data from the lecturers about their intentions for the use of SPVEs supported these categories. Again, it is worth pointing out that the prevalence of ‘demonstrational’ SPVEs could be a discipline specific phenomena, or at least relevant only to those disciplines or topics which involve visual illustrations or presentations of evidence of a concept.

From student interview data, it seemed that such functions might have been lost on students who identified that SPVEs predominantly perform functions related to the facilitation of their cognitive processes, but also showed recognition of their ability to facilitate an engaging lecture experience. Students saw the main functions of SPVEs as being an anchor for their memory, to capture their attention for some kind of interaction and for representation of concepts. It appeared that in capturing their attention, SPVEs might provoke the kind of engaging experience promoted in this thesis. Further, it was also recognised anecdotally that some students had a kind of semiotic engagement with SPVEs, in which the meanings were integrated into an internal narrative which was personally relevant to the student. In this way they used their prior knowledge and experience in order to make sense of the SPVE. It seems that SPVEs might be beneficial, if only because, relative to text, they provide a less

cognitively demanding learning situation, meaning that they might easily facilitate the kind of learning experience aspired to within this thesis.

An analysis of students' notes revealed that students mainly took notes in relation to 'demonstrational' and 'representational' SPVEs, yet 'decorational' and 'symbolic' SPVEs did not invite the same level of treatment. Although based on a small amount of data, it is suggested that students take their cues on their engagement with SPVEs from their lecturers' integration of them. If the lecturer ignores the SPVE, then the student might not engage with it further than noticing it. Thus a potentially rich teaching and learning resource is often overlooked.

It can be concluded from this study that the integration of SPVEs can offer a variety of functions which the lecturer might exploit to achieve pedagogically constructive aims. Yet if lecturers are not explicit about how SPVEs are being used, students might not recognise these functions. It was also noted that student engagement with SPVEs is rather unpredictable. As such it is suggested that although SPVEs have the potential to offer a more engaging alternative to slide-text, they currently do not do so in a pedagogically constructive way because of the way in which they are integrated (or not).

7.3 Discussion

There are two central themes to take further. One central observation persisted through this research; that slide-text can be problematic in slide-lectures. The empirical work has identified that this problem lies in the fact that, although students expect that their lecturers will integrate their slides thoroughly; lecturers are not consistent in following their text structure. Yet as a result of this expectation, students have a disproportionate focus on capturing or making sense of the slide-text, at the

expense of listening to and engaging with the lecturers' speech. Students are therefore distracted from other more fruitful learning behaviours.

The second central theme is the promise of SPVEs, which might offer more cognitive space within which students can have a meaningful engagement. On a basic level, this potential owes to reducing the need to search for the matching text to annotate, and the temptation to copy it. Yet on a more engaging level, the potential owes to their attention capturing nature, and the variety of readings that students *might* make of SPVEs, which are influenced by personal experiences and previous knowledge. Thus this chapter will also discuss the particular use of SPVEs in transforming slide-lecture pedagogy into a more engaging experience for students. The next section provides a discussion of the problematic nature of text, before section 7.5 outlines the potential of SPVEs.

7.4 The problem with slide-text

The main problem with slide-text identified in this thesis is the way in which it is integrated or not with the lecturer's speech, and for what purpose. The problem with slide-text then can be identified by addressing two questions: 1) does the lecturer need to be consistent and explicit in their speech-slide integration? And 2) do they need to make their relationship with the slide explicit? These questions will be dealt with in the next two sections.

7.4.1 Does the lecturer need to be consistent in their speech-slide integration?

Chapter 4 (4.5) revealed that lecturers can vary in the extent to which their slide-text is integrated and also in how explicit they are about how the integration is achieved. Integration can range from a verbatim reading of the text to a complete

mangling of the text such that the messages remain semantically similar yet linguistically disparate. Chapter 5 (5.4.1) showed that this variance might result from differing beliefs about the roles of the speech, slide and student in the slide-lecture triad. Whatever the lecturer's belief, the slide-lecture communicational practice was rarely one in which the speech and text repeated each other. I argue that this is problematic, because the students expect that the speech will repeat the slide in order to explain it. However there are varying views amongst multimedia instruction researchers about such repetition.

7.4.1.1 The problem of 'Redundancy'

In examining studies of 'redundancy' of text and verbal explanations in multimedia learning (e.g. Jamet and Le Bohec, 2007, Le Bohec and Jamet, 2008, Kalyuga, Chandler and Sweller, 2004), the speech-slide combination presents the lecturer with a number of options for the extent and explicitness of integration. Each of these options potentially comes with its own set of advantages and disadvantages in terms of cognitive effects for students.

'Redundancy' refers to the extent to which the speech and text match (or in integration terms, the extent to which the speech explicitly integrates the slide through reading out the slide-text). In 'total redundancy' conditions, the speech and slide repeat each other. In 'partial redundancy' conditions the slide might give a summary of the speech, and in 'no redundancy' conditions, information might be presented only verbally or only visually. There has been much experimental research testing the learning outcome impacts of redundancy in multimedia instruction (for example Jamet and Le Bohec, 2007, Kalyuga et al., 2004, Kalyuga, Chandler and Sweller, 1999, Moreno and Mayer, 2002). The findings have been mixed when different types of redundancy have been tested, specifically related to the mix of written text, spoken

text and visual representation of the same concept. It is generally accepted that 'partial redundancy' is a good compromise for learning, perhaps because the addition of text makes the narration easier to follow (Le Bohec and Jamet, 2008). However, it is not clear from these types of study whether the materials used text that was integrated in a systematic way by the narration or whether the integration more closely resembled a lecture situation where text is integrated less consistently. As these studies are experimental, it has to be presumed that the narration was carefully planned and executed to follow the structure of the text. What then is the impact of 'partial redundancy' in situations in which the speech does not follow the exact structure of the text, such as the lectures analysed in this study?

Paoletti, Bortolotti and Zanon (2012) similarly observed differing levels of integration of slide with speech occurring in slide-lectures. Using the different levels of redundancy, they compared students' perceived comprehensibility of the slides and they reported learning outcomes based on recall and transfer tests following lectures that were given at their different levels of integration, which were;

1. Full Redundancy (FR) (or consistent explicit integration) of the slide-text where the speech and slide were direct copies;
2. Partial redundancy in which the slide displayed a summary or key points (KP) mentioned in the speech;
3. Paraphrasing (P) in which the two streams took different 'linguistic forms' (i.e. the speech mangled the slide-text).

Here the least similar speech-slide-text condition (P) was found to be associated with poorer learning outcomes, and the 'Key Points' condition was preferable to learning, even though the students could comprehend all of the different types of presentation (Paoletti et al., 2012). Interestingly, these researchers also

investigated the effects of 'scrambling' the pattern of the integration of text elements under the partial redundancy and paraphrasing conditions, for instance the speech addresses the key points but in a different pattern than they appear on the slide. It was found that the 'Scrambled KP condition' (i.e. addressing the key points in a different pattern from that appearing on the slide) was most beneficial for learning, possibly as a result of the condition requiring some effort on the part of the student to work out the match between speech and slide, but not enough effort to cause significant cognitive impacts. Yet all conditions were judged to be similar in terms of whether or not students could comprehend the presentation, meaning that they did not consider any of the conditions to hinder their learning.

So Paoletti et al's findings in relation to the pattern of integration suggest that the consistency of the following of the pattern might not be crucial to learning outcomes as tested by measures of learning. This seems contrary to the suggestions emerging from Chapter 4 and Chapter 5 that learning process might be hindered by lecturers differing in pattern and explicitness of integration of slide-text. This discrepancy from my findings might indicate differences in goals of the research, as a measure of learning outcomes such as that used by Paoletti et al does not take into account the student's ability to engage with the slide-speech interaction. Thus although following the slide order might improve what is remembered, it might have an impact on the student's level of engagement with the lecture. This impact might come from the confusion caused by their lecturer not adhering to slide order. Of course, it could be argued that the students' confusion might stimulate their attempts to try to understand the link between the speech and the slide-text, thus leading to a cognitively active experience. Indeed, such linking might be considered a 'desirable difficulty'. Yet as identified in section 5.5, any level of confusion has the potential to

disengage students, or to temporarily divert their attention from engaging with the lecture as a whole, and, as such, it should be avoided. Importantly, the low level of cognitive effort that Paoletti et al suggest is required to work out the link between speech and text might be better spent on other processes, such as, for instance, considering the lecture material in light of prior knowledge.

The extent to which the identified arrangement (or non-arrangement) of integration practices has impacts on learning outcomes is not examined here. Yet through Chapter 5's (5.5) examination of the students' experiences of it, it can be assumed that some students will face difficulties where the experience is confusing. This assumption stems from the students' own accounts of difficulty in matching and assimilating the information, resulting in their dismissing the information as not relevant, or missing the lecturers' explanation of it. So there does not appear to be a clear and suitable solution to the speech-slide integration problem, in terms of whether or not lecturers should consistently read their slides verbatim (potentially resulting in redundancy effects) or 'mangle' the pattern of their slide-text (potentially resulting in confusion). Yet it does seem that lecturers should avoid confusing their students, and consistency and explicitness of integration might be potential means by which confusion can be avoided. In response to the question do lecturers need to be consistent in their speech-slide integration then, it might be said that consistency and explicitness would improve the slide-lecture experience through avoiding confusion, but there does not appear to be a strong basis for recommending a particular integration practice.

Further complicating this issue is that it is possible that the extent to which lecturers match their slide-text is associated with the kind of relationship that the

lecturer has with their slides. The importance of the student's identification of the speech-slide relationship is examined in the next section.

7.4.2 Does the lecturer need to make their relationship with the slide explicit?

Paoletti et al's study did not explore any particular relationship in terms of learning outcomes, and in the only research which does examine relationships, Schnettler (2006) did not focus his research on learning outcomes. It is therefore difficult to estimate what impacts different relationships might have on the learning outcomes of students receiving them. Yet based on conceptions of 'good teaching' practices (for example Ramsden, 2005) it can be assumed that making such relationships explicit might be crucial in communicating to students what the slides are being used for and therefore what the student should be doing with the slides. It is recommended that to achieve the best educational outcomes in HE, teaching objectives must be aligned with the teaching method chosen, and that teachers should make explicit what kind of learning is expected of students (Biggs, 1999). Since the lecture can be used to achieve many different functions (see Chapter 2, section 2.2.2), it should not be assumed that students will understand what that intended function is.

Applied to the slide-lecture relationships identified ('referent' and 'scaffolding'), these are likely to become important to learning when the student is copying the slide-text, or does not understand the relationship that the lecturer is having with their slides. There is a danger these students might miss a 'referent' type relationship in which the lecturer assesses the claims made on the slide and perhaps refutes them, or contradicts them. Here the student only takes away the information appearing on the slide, and not the explanation for why it was placed there. When the

student expects that the text can be used as a basis for revision, they are likely to be mistaken, and consequently, learn the wrong things.

On the other hand, the 'scaffolding' relationship might be similarly problematic for learning. Chapter 4 (4.5.3.1) suggested that the 'referent' relationship might be more closely linked to a lecturer who consistently follows the slides and the 'scaffolding' relationship more closely linked with the least consistent lecturer in terms of integrating the text. Where the lecturer adopts the 'scaffolding' relationship which is likely to be inconsistent, students may be left with confusion about which element the explanation refers to, or even no explanation of some of the slide-text. Further, given the subtle nature of the integration that this relationship necessarily involves, it is possible that students might be left wondering whether the slide and speech are linked at all. Given that students in Phase 2 of this study reported the assumption that speech perceived to be unrelated to the slide-text is not important, it is possible that if the link is not immediately apparent, students may disregard what the lecturer is saying. This reflects Adams' (2006) arguments that PowerPoint gives the impression that if something isn't represented on the slide, it is probably not that important. Thus it seems important that the lecturer makes clear the link between the intended learning outcomes and their speech-slide relationship, in order to avoid such an assumption. In response to the question of whether lecturers should make their relationships explicit then, I would be inclined to suggest that they should. However owing to the lack of knowledge on this subject, it is accepted that further research is needed in this area in order to come to firm conclusions.

Since the lecturers' mediation of, and relationship with slide-text is potentially hazardous to an engaging learning experience, it seems important to consider what solutions might be available for lecturers to avoid the perils of the speech-text

relationship. There have been a number of suggestions for enhancing slide usage, one of which being that slides should be concise, that is, simply reduce the amount of text on the slides. It makes sense to consider the extent to which the amount of slide-text matters to the learning experience of slide-lectures. Before the text based slide is written off completely then, the next section considers what can be said about the effects of different amounts of text.

7.4.3 Can reducing the amount of text on a slide provide a comfortable solution?

Of course the amount of text appearing on the slides is an important consideration when examining the integration of text, for it is possible that slides with reduced text present less difficult processing situations than those containing lengthy prose. There is a small body of literature which considers the learning outcomes in relation to 'concise' versus 'regular' amounts of text. However, within this body of literature, there is not an accepted definition of what makes a concise slide. For instance Wecker (2012) suggests; 'first, they contain only very limited information on each slide' and 'second, parts of the presentation are not accompanied by projected text' (p. 263). Paoletti et al (2012) describe their 'Key Points' condition as being concise, and their definition of this condition is 'an outline of the main points which summarizes key information' (p. 3). The most unconditional definition is Blokzijl and Andeweg's use of the 6x6 rule in which there are no more than 6 bulletpoints per slide, and no more than 6 words per bulletpoint (Blokzijl and Andeweg, 2006). However this rule does not give clues about the type of information to be included (e.g. a summary or a verbatim copy merely split into several slides). There is not a particular distinguishing characteristic of 'concise' and thus it is possible that

lecturers and researchers might interpret the term differently, with some believing their slides are concise when in fact they might not be so.

Nevertheless, Blokzijl and Andeweg (2006) carried out a comparison of concise slides (defined as text conforming to the 6x6 rule) with extensive slides (defined as not following the 6x6 rule i.e. allowing complete sentences and phrases), and also compared slides containing animations only. This comparison was focussed on the learning outcomes measured by a multiple choice questionnaire (MCQ) style exam, and the reflections of students on the instructional designs. Through testing recall of items represented in either the slide or the speech they concluded that, although any form of visual support improves scores on the MCQ, both of the text conditions yielded better results immediately following the period of instruction. However, the concise condition proved inferior to the animations and extensive text in terms of test results following one week. It is likely that this finding relates to the amount of text available to students to revise from before they were tested. In conclusion, the authors point out that it remains unclear what is the best way to visually support a presentation.

Paoletti et al's (2012) study found that the scrambled 'Key Point', or concise but mangled condition was most beneficial to learning outcomes. Similarly, Wecker's (2012) experimental approach examined the retention of information from speech and from slides in 'regular' (i.e. text heavy) PowerPoint lectures compared to 'concise' PowerPoint lectures and speech-only lectures. He found that not only did students retain more information in the condition without slides than with 'regular slides', but also that 'regular' slides have a suppressive effect on the retention of speech information. Thus in post-tests designed to test recall on concepts that were covered by the speech only, or by the slides only or by both together, the 'speech-only' and

'concise slide' information was retained more than information presented both orally and by 'regular slides'. Wecker concluded that 'concise slides' should be used in lectures rather than 'regular' slides or speech alone. This was despite the finding that students in the concise slides conditions reported higher 'cognitive load' than in the regular or speech-only conditions (although this was not statistically significant). This 'cognitive load' might be put down to the effort required to match the speech with the concise information.

As Wecker's findings indicate, this linking process might be beneficial in terms of the student being forced to make a cognitive effort to uncover the link between the two (i.e. to identify the integration), rather than overlook the text or speech all together. Furthermore, Wecker would argue that the condition might even convey messages about the importance of either stream:

> 'It can be hypothesized that this kind of slides (sic) avoids inferior retention of information from speech in two ways: First, they provide less occasions to focus one's attention exclusively on written information on slides because at each point in time either no written text is projected on a slide or the written text on the slide actually projected is obviously not the whole story. Second, this kind of slides may convey the general message that there is important information to be attended to that is not written on slides.' (Wecker, 2012, p. 263)

Thus if the text is cut down to a minimum, students no longer have the option to focus solely on it, and may even be encouraged to think about the relative importance of the speech stream. It is therefore possible that concise slides have an

impact on the extent to which students perceive the speech and slide streams to be important, and therefore might help to alter the slide-lecture culture which currently accepts that what is on the slide is paramount and the speech is merely its spokesperson.

In relation to the CTML then, these findings and the findings outlined in 7.4.1.1 in relation to 'redundancy' suggest that, although students potentially have more cognitive workload in 'concise slide' and 'scrambled' conditions, they may retain more information from both the slides and the speech than the participants in the regular slide and the speech-only conditions. The findings of the current research in relation to note-taking might be used to explain such 'concise' versus 'regular' effects in psychology lectures. For instance, the student annotating their slide handout might not need to attend closely to the slide-text in a concise condition, as undoubtedly it would not take as long to read as would a 'regular' slide. Alternatively, for those employed in copying the text, the slight advantages of the 'concise' conditions might be explained by the way in which students might not spend so much time copying text. Thus whichever note-taking practice is employed in the 'concise' condition, it is possible that it provides a situation in which students are facilitated to pay attention to and retain information from both the slides and the speech, rather than selectively attending to one or the other.

However, I would argue that despite the potential for easing processing and retention, such a situation could be questioned in regards to its value as a learning activity over other types of activity which might be more engaging. Although 'scrambling' concise slides might be beneficial for retention of information, these studies tell us little of the learning processes involved in this retention, and whether there are any differences in opportunities for engagement further than simply

recognising the integration of slide-text with speech. It is possible that the cognitive effort required to match speech and slide-text might be better placed in more educationally beneficial pursuits if we consider the conception of learning assumed for this research. That is, engaging with the material and considering how it fits with prior knowledge and experience.

A further area of concern regarding the conciseness of slides is that it is still necessary for lecturers to integrate this minimal text into their speech and as discussed already, this integration is often problematic for both students and lecturers. Although it was not clear from Wecker's study the extent to which the speech integrated the differing amounts of slide-text, it is likely that in an experimental design the integration was carefully planned to follow the expected structure in order to control for extraneous variables caused by a mismatch. Further, in Blokzijl and Andeweg's (2006) study, the same lecture audio was used for each of the presentation styles, so it can be assumed that integration of the text was not carefully controlled, as the text was different in the two text conditions. Only Paoletti's study took into consideration conditions most closely resembling a live lecture situation, yet it did so consistently throughout the lecture. As has been shown in sections Chapter 4 and Chapter 5 (4.5.2.2 and 5.3.3.1), this level of consistency of integration practices was rare among the sample. Thus it might be that application of these findings to a more naturally occurring lecture might not be entirely possible. Thus it is reasonable to accept the finding of the current study in relation to the problematic nature of text in slide-lectures in terms of student learning, yet also accept that it is possible that the amount of text displayed might worsen or lessen the situation.

What might have been useful for the current research then is an examination of the extent to which the lecture slides could be categorised as 'concise' or 'regular'.

This would enable comparison of the levels of integration in the different conditions on the learning interaction supported by these different types. Yet the different conditions examined here were naturally occurring lectures, in which the lecturers were not attempting to apply particular 'rules' to their slides. So it would be relatively fruitless to attempt any kind of categorisation on this basis. What might be a potential avenue for further exploration of the student experience is a similar form of qualitative examination of 'concise' and 'regular' slides in terms of the extent to which they create conditions in which a pragmatic learning experience can be achieved.

Overall, the status of the 'concise' versus 'regular' slide debate remains unclear. On the one hand concise slides might elicit some extent of cognitive engagement with the speech and slide material and may avoid students attending to the slides disproportionately. On the other hand it is not clear how such concise slides should be integrated and also what their impacts might be in the dynamic interaction between lecturer, slides and audience, and therefore the slide-lecture experience. Further, the effects of 'scrambled' versus consistent integration are also unclear in terms of their benefits for the learning experience. Given the questionable nature of the displaying and integration of slide-text in naturally occurring slide-lectures, in which learning might be helped or hindered in various ways, one might question whether we really do need slide-text? The next section does so through considering what happens when text is removed.

7.4.4 Do we really need slide-text?

It is important to question why text remains so dominant in lectures today. It is acknowledged here that small, but rising numbers of academics and presenters in many fields are adopting more visually oriented presentation techniques such as

PechaKucha, which is heralded as advancement in visual presentation techniques. Here, presenters are encouraged to eliminate text altogether in favour of SPVEs. Additionally, Prezi aims to eliminate the typical PowerPoint style presentation by introducing a non-linear element to the slide transitions through the creation of 'mind map' style presentations. Using such software, the presenter takes the audience through the mind-map by zooming from one 'slide' to another whilst allowing the audience a glimpse of the overriding structure of the map in between. Crucially though, the aims behind Prezi are for a more visual approach to presentations (Prezi, 2010).

Few studies have compared PechaKucha and Prezi lectures to what can now be referred to as the 'traditional' slide-lecture. Indeed, only one study has attempted such a comparison, in which learning from a slide-lecture consisting of 47 bulletpoint slides was compared with learning from a six slide PechaKucha presentation (Klentzin, Paladino, Johnston and Devine, 2010). It was found that the PechaKucha condition was equally as effective as the 'traditional' slide-lecture in terms of learning as measured by a single post-test. Yet this study utilised PechaKucha presentations which also contained text, and did not include a visual-only condition. Although providing some evidence of the beneficial impacts of significantly reduced (or concise) text (6 slides worth rather than 47), it remains to be seen whether such an approach would provide an alternative to the current slide-lecture paradigm.

Prezi on the other hand has gained more attention from technology and education commentators, yet the literature to date does not present any empirical evidence of its effectiveness in the lecture over other models. It is currently difficult to tell how widespread both approaches are becoming. Yet it must be noted that none of the lecturers in the study adopted these approaches for their lectures, although Dr.

Brindley admitted to being informed by the PechaKucha approach, such that she intended to include more SPVEs. However the lecture still included much text in addition to these SPVEs.

Further it must be acknowledged that a PechaKucha approach utilises PowerPoint software, and Prezi also allows the inclusion of text in the slides. Therefore it is likely that, although the structure of the presentation might be changed by these approaches, the same text based lecture situation might persist in Prezi and PechaKucha presentations, as the text outline model has now become an institutionalised habit. Thus a truly visual approach does not seem to be immediately available, even if the slide medium is changed.

Although currently there does not appear to be much support for the removal of slide-text altogether, the findings of this research would encourage debate over whether or not it should be abandoned based on the pedagogic culture that it creates. The major argument in favour of slide-text seem to be that it is useful in providing a handout to satisfy the needs (and wants) of students. Yet in order for students to take them home and use them for revision, the slides need to be readable in isolation, i.e. they need to make sense outside of the lecture. Thus slide-text is usually extended and verbose as opposed to the 'concise' recommendations. The pressure is on the lecturer to make the slides useable in the absence of the speech, or as Gold calls it the 'PowerPoint reading problem' (Gold, 2002). Perhaps this 'readability' is responsible for the understanding that the outline notes provided by the lecturer are a complete record of the lecture amongst students. Thus the slide-lecture culture encourages the students' rather passive reliance on the slide-text as a blueprint for their exams, and the understanding that learning this text equates with success on the course. This is questionable at a pedagogical level as well as a communicational level. In terms of

pedagogy, such ‘spoon feeding’ inevitably leads to a memorise-and-regurgitate model for students’ independent study practices (McKay and Kember, 1997), which seems inappropriate for a HE education. In terms of lecture-based communication, not only does this situation overshadow the content of the lecturers’ speech (leading to Weckers’ (2012) ‘speech suppression effect’), it potentially leaves students confused about the role of the text *in the lecture itself*. As the slide-text is required in this paradigm of teaching, there is a tension between providing a useable resource for the student to employ later in their studies, and using this resource during the lecture in the first instance. Although slide handouts might be practically useful then, they do little to justify slide-lectures from the perspective of a pragmatic learning scenario.

Overall, the research findings can be combined to argue that the traditional text slide-lecture paradigm presents a number of issues which are difficult to resolve;

1. The text outline model of lecturing raises expectations for a consistent integration of slide-text with speech which aren’t always met in practice;
2. The lecturer’s relationship with their slide-text is not always evident, meaning that students might take away the wrong messages from the lecture;
3. Regardless of whether or not lecturers meet the integration expectations of students, students focus primarily on the slide-text and might even be involved in the seemingly ineffective practice of copying slide-text, and consequently;
4. There is little room for a meaningful engagement with the lecture material.

It could even be argued that it would not be profitable to solve these issues by prescribing certain means of integrating slide-text, as this would certainly remove the uniqueness of lectures. However, this research has identified little evidence that lecture slideshows need to contain a text outline of the lecture; rather there is more

justification for a different *role* of text in the slideshow. Thus it seems that, although a text outline should be less prominent in slide-lectures, text should not be omitted entirely as it can be used for roles other than an outline. Rather any text that does appear should be integrated with both the speech and SPVEs in order to support the lecture communication practices, instead of being included for the benefit of students' note-taking practices or reminding the lecturer of what to say. Thus an alternative is proposed; the use of slides as an artefact to be explored, rather than as a scaffold for the lecturers' speech. This alternative is discussed in the next section.

7.5 An alternative PowerPoint paradigm: Slides as a visual evidence

As mentioned in Chapter 2 Maxwell describes an alternative *paradigm* of PowerPoint usage, that of an artefact that needs to be explained:

> 'one might compare effective PowerPoint lectures to a guided tour of a museum: PowerPoint slides are the artefacts on display, and the lecture is the tour guide's commentary, during which questions may be asked and answered'. (Maxwell, 2007, p. 50).

Here it is not simply the replacement of text with SPVEs that Maxwell advocates, rather he advocates an approach in which the lecturer uses the SPVEs, and indeed any kind of slide-element, in order to coax an interpretation out of students. Maxwell describes an instance during one of his lectures in which he used photographs of 'Nazi death squads in action' upon which he based a discussion with his class:

> ‘I asked the class why the many photographs they had seen consistently showed people being shot in the back of the head: “What's so special about the back of the head?” Students proposed several theories, and somebody eventually produced the answer I was fishing for: executioners do not want to look into the eyes of the victim’. (Maxwell, 2007, p. 48)

Here, the lecturer asked his students to engage with photographs in order to predict the meaning of the inclusion of the photographs in his lecture. The point of interest here is that ‘students proposed several theories’, hence the students were engaged in attempting to work out the meaning of the photographs for themselves. This example seems to be conducive of a meaningful learning experience for the students who were actively involved in constructing the explanation. Of course the same might be done with text, and indeed Olliges, Mahfood et al (2005) recommend that by showing just the title of a slide first, students can be asked their thoughts about what information might be covered in relation to that topic. In this way new information might be introduced that the lecturer had not thought about. Further, Olliges et al argue that once this thinking has been done and the ‘correct’ information is revealed, students would then become involved in processing their thoughts into the ‘boundaries’ or structure that their lecturer has imposed (Olliges et al., 2005). Thus it is possible that both text and SPVEs can be used in order to encourage engagement towards particular pedagogical aims.

It is possible that a more beneficial approach would be one in which SPVEs *and* text are more explicitly integrated. There is a small body of educators adopting what can be termed a ‘visual evidence approach’. This approach is defined by Alley

and Neeley (2005) as a design in which the slide contains a succinct sentence heading which outlines the purpose of the slide, along with visual evidence for the headline. This is thought to be advantageous over the 'soon-to-be-forgotten' bullet list as the approach to slide design is thought to be more oriented to the needs of the audience *during the presentation*. Moreover, it is thought to be more memorable for the audience, and more persuasive than bulletpoint lists (Alley and Neeley, 2005). Yet in a comparison of a traditional text-heavy PowerPoint approach and a similar 'simplified, visually rich' approach over the length of a course, there was found to be no significant difference in learning outcomes between the two (Johnson and Christensen, 2011). However, Johnson and Christensen noted that students reported that they preferred (or 'liked') the simplified visually rich approach to the text heavy approach. One thing to note in relation to Johnson and Christensen's study is that, firstly, all students were given handouts of the traditional style text slideshow *in addition to* receiving the slideshow for their condition. Secondly, it is important that the measurements of learning were made at the end of the course. It is possible (although not examined by the authors) that the text handouts would have been utilised by all of the students in preparation for the exams, meaning that they would all be on the same level by the time of the examination, despite receiving different lecture slideshows.

Such experimental comparisons of visual versus text-based slides were primarily evaluated using tests of knowledge. Yet it might be more important that the students' attitudes were more positive to the visual evidence presentations, as a positive experience is potentially more likely to lead to a meaningful engagement than a negative or 'boring' one. As both of the above studies identified that students preferred the visually rich presentations, it might be assumed from these findings that

these lectures were more engaging, although the levels of engagement experienced by the students was not measured in each condition,. Of course, whether or not the level of engagement can be linked to learning remains contested, and the notion of 'boredom' can by no means be considered synonymous with judgements about pedagogically beneficial practices. Indeed it is noted that students might report higher levels of learning in lectures designed to be engaging, yet lacking in content compared to 'boring' lectures high in content (Ware and williams, 1975, Marsh, 1982). Arguably though, whether or not a lecture is perceived as 'boring' is a factor in their likelihood to interact with the materials. Moreover, there is no reason why a lecture cannot be visually entertaining *and* pedagogically effective. Perhaps a 'visual evidence' approach might achieve such a combination.

In the alternative model suggested, text is not used as a guide to what is to be spoken about; rather, it is used in a different capacity, such as the speech conveying one message whilst the text conveys another. Gabriel highlights the benefits of having such a 'multiplicity of signals' in a presentation which produces novel effects:

> 'There are different performance risks that can be taken (e.g. risqué slides, collages, discontinuities, omissions and disruptions); there are fascinating and troubling juxtapositions of narrative and imagery; there are startling possibilities of irony and self-parody, where the spoken text points in one direction and the projected picture in a different one. In such ways, the lecture can be reconfigured from listening carefully to a single voice of authority to an experience of seeking to decode a multiplicity of signals, some audio, some visual, which sometimes reinforce each

> other, sometimes are out of step with each other and sometimes interact with each other to produce novel effects' (Gabriel, 2008, p. 270).

Gabriel's 'performance risks' could be considered similar to the lecturer's relationship with the slide. Here, in the speech pointing in one way, whilst the text points in another, it seems that Gabriel is advocating a 'referent' style relationship over a 'scaffolding' style. In this way, the slide material would take the form of an artefact that the lecturer wishes to show to students, and their speech would serve to explain it, and its relevance in the lecture. Thus it might be suggested that the inclusion of text is not so problematic, as long as the lecturer's relationship with it follows the 'referent' style, rather than the 'scaffolding'. It also suggests that the slideshow should not be viewed alone after the lecture; students doing so will miss out on the other half of the performance, so the text-outline model is negated.

However, Chapter 5 (5.5.2) has highlighted that such a relationship might not be perceived by students, as when confronted with text they are typically searching for the relationship to be one in which the speech makes sense of the slide-text. Thus it can be argued that, unless students are primed to think about the slide-text in a particular way, by the lecturer being explicit about their relationship with the slide-text, it will not be viewed as anything other than an outline of the main points of the lecture. It is clear that lecturers are rarely so explicit about their relationship with text to 'prime' their students' to think of it in a particular way, and further, their relationship might change for different slides and slide-elements throughout the lecture (as shown in section 4.5.3.1). Therefore, it is likely that students will miss the lecturers' use of text as an artefact. Nevertheless, in considering the meaning making

processes involved, the approach has much potential for promoting a meaningful learning experience as outlined in the next section.

7.5.1 Learning and the alternative PowerPoint paradigm

A 'visual evidence' approach makes sense if we consider the meaning making processes of both text and visual representations within the same message. According to Kress and Van Leeuwen (1996), although text and visual objects represent their meanings differently, they both involve a cultural and societal mediation in order to understand them. Text and visual objects within the same message have different representational or meaning making potentials, yet the process of uncovering these meanings does not separate them out, rather they interact (Kress and Van Leeuwen, 1996). Thus the mode communicated from teacher to student does not necessarily determine the mode that the student will utilise in order to make meaning (Jewitt et al., 2001). For instance, in Jewitt et al's study on science learning in schools, students were given a verbal analogy of onion cells looking much like a brick wall. Students were then asked to look at the onion cells through a microscope and then to write up what they did afterwards, including drawing pictures of the onion cells. In this study, students translated the brick wall analogy into a visual representation and then again into a written description (Jewitt et al., 2001). To Jewitt et al, this research affirms the notion that learning is a process of actively remaking and transforming the information and messages that teachers communicate, from one mode to another. The simplest means of modelling this in students in a slide-lecture might be to ask them to explain verbally the meaning of the slide-element.

Yet if we consider how people read visual information, and how students might transform different slide-elements into a verbal narrative, it is possible that lecturers might entice pedagogically relevant interpretations out of their students

without overtly interacting with them. Although students are not involved in any outward interaction with their lecturers or peers during a lecturer's speech, they are not necessarily passively receiving knowledge. Indeed a Bakhtinian perspective on interaction does not preclude the possibility of dialogue *without* public and overt communication between two participants (Burbules and Bruce, 2001). From this perspective, students would actively interact with and transform the slide-element into private 'speech', or an inner-narrative. So even if the lecturer does not ask their students to talk explicitly about the information, they can set students on the path to do this thinking by themselves through providing a framework for interpreting the slide-element. This kind of autonomous thinking is exactly the kind of activity that a pragmatic conception of learning advocates over the more passive receiving and memorising of information that the current PowerPoint paradigm supports.

The provision of such a framework could easily be achieved by explicitly employing a 'referent' relationship with the slide-element(s), in which the lecturer points out specific points of interest, questions them and comments on and interprets them. What seems key though is that students are primed to join in with this thinking through lecture-based communications, rather than being primed to expect that the lecturer will talk through a text outline. This might well be achieved if the current text-outline model is challenged through lecturers taking more disciplined approaches to slide-lecture communication. The proposed visual evidence approach in combination with lecturers explicitly employing a 'referent' relationship might be a promising option as an alternative approach owing to its affordances for inviting students into an interaction with the materials. Before outlining the conclusions and recommendations that can be made in relation to slide-lecture pedagogy though, the

next section summarises what this discussion has established about the position of the slide-lecture.

7.6 Summary: what is the outlook for the slide-lecture?

This chapter has examined the two main threads that have run through the thesis: that text outlines are problematic for slide-lecture communication; and, that a different slide-lecture model might provide opportunities for more engaging lecture experiences. Through examining these threads, it was identified that lecture pedagogy might benefit from a shift from the current 'text outline' model of slide-lectures to one in which the slide serves to provide visual evidence of the topics of discussion. Further, in considering the conception of learning adopted for this thesis, it was identified that lecture based communications should perhaps be designed towards inviting students into an explicit guided interaction with these elements in order for them to have a meaningful engagement.

The outlook for slide-lectures, then, is that it is clear that the current dominating text-outline paradigm should be challenged, potentially by the adoption of a more visual approach to slide-lecture communications. It remains now for the following chapter to outline the conclusions that can be drawn, and therefore the recommendations that can be made for undergraduate psychology teaching through considering what answers have been provided for the research questions.

Chapter 8 Conclusions

8.1 Introduction

The last chapter outlined two major issues arising from this research: the problematic nature of the text outline model of lecturers: and, the potential of a 'visual evidence' approach to slide-lectures. Crucially though, it identified that lecture based communicational practices should be more carefully considered for their ability to invite students into a meaningful lecture interaction. This chapter follows on from the discussion in outlining the general conclusions that can be drawn from the research (section 8.2), and from these conclusions, examine whether the intended contribution to knowledge for the thesis has been fulfilled (section 8.3). Finally section 8.4 makes some pedagogical recommendations about slide-lecture practice, and also about the directions that should be taken in researching slide-lectures.

8.2 General conclusions relating to pedagogy and learning

The main conclusion that can be drawn from this thesis is that talking through text outlines in slide-lectures is not the ideal communicational model for lecturing because of the resulting focus on the slide-text within students. It can be argued that the displaying of slide-text plays little part in both the performance and the understanding of the lecture as it is given, although it may play a part as an aide memoire for both lecturers and students. Although PowerPoint slides can be used to create a handout of the lecture outline for use later in the students' studies, this facility might result in the creation and displaying of lengthy text slides simultaneously with speech which matches it to varying extents, a practice for which there is little justification (although it is accepted that small amounts of text might be useful, such as short captions). Further, this may add weight to the students' conception of the

lecture as residing on the slides, and the tendency for them to fixate on the slide-text as something to be memorised for their exams. This experience of learning does not fit with the pragmatic conception of learning employed in this research in which the student engages in an interaction with the material in order to locate it in terms of prior knowledge and experience. Thus whether the lecturer is explicit in their interaction or not, there is a risk of disengaging the students when using text and reinforcing the idea that students need only 'learn the slides' to succeed. Yet it might be difficult to change this model of lecture based communication as both lecturers and students tend to consider it the most efficient means by which students can be prepared for their exams, whether or not this is true.

If one adheres to the conception of learning as an experience which engages students in a more profound learning activity than merely copying or memorising text, an alternative lecture pedagogy might be justified, in which slide-text is less predominant. An approach, in which the speech-slide integration takes the properties of a 'referent' relationship, might provide such an alternative, especially if SPVEs are integrated and questioned within such an approach. Indeed SPVEs have been shown to elicit the kinds of critical engagement favoured within a pragmatic framework of learning. Yet, of course, the evidence in relation to the extent to which this engagement can be achieved through SPVEs over and above that which can be achieved through text or other elements remains to be seen. It is possible that such engagement might be modelled around text and other types of element also, yet it is crucial that whichever element is used, the lecturer's communicational practices surrounding them are aimed towards this goal.

Overall, it is concluded that although slide-lectures might offer the lecturer a useful means of organising and structuring a text outline of the lecture for both

lecturers and students, the displaying of such an outline *during the lecture* is often less profitable than it might be. This is because text hinders both communicational and meaningful learning processes. On the other hand, SPVEs are being used by lecturers already, and with so many possibilities for what one might do with them, they should be considered by lecturers and pedagogy researchers alike as a potentially rich resource. It is suggested that taking a more principled approach to the integration of slide-elements, and especially SPVEs might assist in the search for creative approaches to the mediation of communication during slide-lectures. Perhaps this could be achieved through the explicit integration of slide-elements, particularly SPVEs, utilising a 'referent' relationship.

As stated in section 2.8, the intended contribution to knowledge of this thesis was an account of slide-lecture communication practices in terms of how they are enacted, conceived of and experienced. From this the intention was to identify a creative approach to the re-mediation of slide-lectures. It remains for the next section to outline exactly how this thesis has contributed to knowledge on the subject before recommendations can be made for practices which potentially should characterise the slide-lecture.

8.3 To what extent has an original contribution to knowledge been made?

Although there has been much debate about the slide-lecture, little was known about the communicational practices involved. Although a limited body of literature comments on the communicational context of slide presentations (e.g. Knoblauch, 2008, Schnettler, 2006), what has been lacking is a description of slide-lecture practices based on a systematic empirical examination. This description of slide-

lecture communication practices in relation to text was carried out through examining slide-lectures given on a single topic. Firstly, it was identified that there are many different presentational options available to lecturers in terms of the kinds of representations that are included on their slides. A taxonomy of different slide-elements was therefore identified, within which it was identified that text is the most utilised type of representation in slide-lectures. It was then demonstrated that integration of this text with speech can vary along a continuum of explicitness (section 4.5.1.3), and also that lecturers can vary significantly in their consistency of integration of text (section 4.5.2.2). A description in relation to SPVEs was also provided, through examining slide-lectures given on multiple topics. It was found that integration of SPVEs can vary in terms of the extent to which the SPVE is exploited by speech. A taxonomy of levels of integration was identified (section 6.3.3), for instance no integration was found in a 'decoration' function and minimal integration in a 'representation' function. However, SPVEs were also integrated more explicitly and extensively in an 'explicit symbolism' and 'demonstration' function.

Additionally to the lack of knowledge about the communicational practices involved in slide-lectures, it was also identified that there was little knowledge about the culture behind/ created by slide-lectures and their practices. Through examining interview and documentary data, some tensions between lecturer intentions and student practices in relation to text was exposed. It was identified that lecturers gave little justification for showing text during the lecture, other than to guide their speech and to provide a slide handout to be annotated (section 5.4.1.1). Yet whereas lecturers intend for their students to use their slide-text handouts as an outline to be annotated (section 5.4.1.2), some students did not do so, and instead some copied the slide-text at the expense of listening to the lecturers' speech (section 5.5.1).Through these

findings it is suggested that the text outline model of slide-lectures, which is clearly prevalent in psychology teaching, represents an interesting conundrum. Both lecturers and students might feel that it should be shown during the lecture, but there is little pedagogical justification for doing so, over and above reminding the lecturer what to talk about. Although it was identified in the discussion chapter that a concise outline might provoke some cognitive engagement of the student with the speech and slide, it is argued that this cognition could be better focussed on a more meaningful interaction. Thus slide-text has been shown to be problematic both in terms of the lecturers' communicational practices, and the students' learning processes.

As an observation, this is by no means surprising, and indeed much of the criticism aimed at PowerPoint has made such claims (e.g. Tufte, 2004). Yet this research also highlights the specific practices associated with text which are problematic, that is, that if the student is focussing on the slide-text, and expects a certain kind of relationship ('referent' or 'scaffolding'), violating this expectation might serve to confuse students and leave them guessing where the speech links to the text. It has been argued that in forcing students to work the link out, the lecturer might be providing the opportunity for some level of active processing through prompting an interpretation of both streams (e.g. Paoletti et al., 2012). However, this thesis has highlighted that the difficulty that students perceive in making the link might lead them either to switch off, or to be blind to the link. It seems that the student's cognitive efforts might be better spent on other activities, for instance in engaging with the lecture material.

It has been identified that an SPVE heavy approach might afford the cognitive space in order for this engagement to occur, and indeed others have advocated such an approach (e.g. Alley and Neeley, 2005, Maxwell, 2007). Yet through examining the

use of SPVEs in slide-lectures, it was identified that SPVEs were most often used for the least pedagogically constructive functions as identified through their integration with the speech (section 6.3.2). Nevertheless, it was found that students recognised the affordances of SPVEs for facilitating their cognition during the lecture, and also recognised the potential of SPVEs for a meaningful and engaging interaction with the lecture material (section 6.5.2). Some evidence for this potential was identified; however it remains to be empirically justified.

In a qualified way, this thesis joins the body of literature rejecting the use of PowerPoint in psychology lectures (e.g. Maxwell, 2007, Hill et al., 2012, Adams, 2006). It argues against a predominantly text slideshow and for a further exploration of a 'visual evidence' approach. However, such an approach might be of benefit only if it is modelled by the lecturer through an explicit integration, rather than being left to chance. Further it identifies the 'referent' relationship as the particular form of slide-lecture communication practice that might help achieve educational engagement. These contributions point to some recommendations which can be made about slide-lecture practice in undergraduate psychology teaching. These are outlined below.

8.4 PowerPoint pedagogy recommendations

The first recommendation that can be made by this thesis is that a more principled and thoughtful approach to slide design would be useful in terms of creatively re-mediating the psychology slide-lecture. Specifically, it seems that instead of text-outline models, lecturers should seek a more engaging alternative. One of these alternatives might be the more integrated 'visual evidence' approach (e.g. Alley and Neeley, 2005), particularly if SPVEs are employed. Yet it is acknowledged that an approach which focuses on SPVEs might require a more creative approach to

slide design by lecturers, which might imply a more labour intensive planning process. Clearly though, psychology lecturers are currently adding SPVEs to their text slideshows, so it seems that such work would not be inordinately taxing for these lecturers. Rather, it might be a simple case of considering where an existing SPVE can replace the slide-text outline instead of accompanying it. But it is acknowledged that a text outline is important for both lecturers in terms of guiding their lecture speech, and students in terms of facilitating exam preparation. Potentially then, the lecture should be accompanied by two separate resources, one being a text- outline handout which can be used *following* the lecture and also a 'visual evidence' slideshow which is used for a different purpose *during* the lecture.

Within this approach, any kind of visual evidence can be used, including text and SPVEs. Whatever type of representation that lecturers use however, it is clear that as well as considering the needs of the student *after* the lecture, lecturers also need to consider the needs of the student *during* the lecture. Thus the second major recommendation which can be made is that integration of any type of element with speech should be more prominent in the minds of those giving slide-lectures. Specifically, when preparing a slide-lecture, it makes sense that the lecturer is clear about what they are using their slides for (whether a 'referent' or 'scaffold') and perform the lecture in such a way as to communicate this purpose to students. Further, even if the lecturer does have a particular intention behind their use of each slide-element in the presentation, they shouldn't assume that students are picking up on what they are doing. What seems important is that when writing a lecture slideshow, the lecturer should not to forget about what her students might do in response to it, and instead consider the student's perspective when planning her role as mediator, or map-reader for the slide. This explicitness is in line with 'good teaching' practices as

recommended by Ramsden (2005), who advises that lecturers should be clear about their expectations in all learning situations.

Of course since these recommendations emerged out of examination of lectures in psychology, these recommendations might be limited to lecture practice in this discipline. Indeed there may be disciplines which do not use slide-lectures at all, and others who are already practicing the SPVE heavy approach advocated here. It is therefore up to the individual lecturer to consider the extent to which these recommendations are useful to lecturing contexts outside of undergraduate psychology. Although these recommendations have been well considered then, it is recognised that there may be further limitations to their operationalization. These are outlined below.

8.4.1 Caveats to the recommendations

It should be mentioned that converting to the use of visual-only approaches might result in some level of dissatisfaction amongst students who have come to rely on slide-text for their learning. Consideration of students' satisfaction is perhaps becoming more and more important in the context of rising tuition fees, and the 'student as consumer' mind-set outlined in Chapter 1. It seems that since students have come to expect that the slides will contain a lecture outline, as identified in section 5.5, meeting this expectation is important to their satisfaction. This highlights a well-trodden discourse within HE regarding the tensions between what students *like* and what is good for learning. Although it is not necessary for learning, in today's HE context it is *relevant* that students like their teaching experiences. So potentially, any changes to the slide-lecture practice should take into account what is likely to be accepted by students, however, they shouldn't be determined by student satisfaction concerns.

Furthermore, it is acknowledged that such a shift in practice should be based on sound evidence of educational gain. Thus efforts are required to uncover the learning impacts of such an approach. Currently, empirical evidence is limited, and although this research has examined the learning experience in relation to slide-lectures, the design prevented any comparisons of different types of lecture. Yet it was noted that in carrying out the research, some potentially useful methodologies emerged which might be worth further utilisation in the examination of slide-lectures. The next section outlines some recommendations about how such empirical evidence might be provided.

8.5 Future directions for slide-lecture research

The recommendations regarding the integration of SPVEs suggest that an interesting avenue for further exploration is a measurement of students' interactions with SPVEs versus text and other slide-elements, rather than focussing on measurements of learning outcomes in response to both. It is likely that students might have interactions with both SPVEs and text, which would be a pleasing outcome. Yet the point here is that it can be assumed that SPVEs offer such opportunities for interaction without further examination. Chapter 6 mentioned a mishap that occurred during the collection of data, namely that for one lecture the slide handouts was not printed perfectly. This led to a situation in which the students had access to the VEs but not the text during the focus group. Rather than treat this as a methodological problem it presented an interesting approach to the focus group by enabling the exploration of the extent to which students blended the SPVEs into a personal narrative through attempting to remember its purpose in the absence of the accompanying text. Some invaluable insights were gained through this method; however this accident occurred for the last lecture visited during the phase of study,

so the approach could not be adopted for the other focus groups. So it is recommended that an ‘obscured slide-text’ methodology might be a useful tool for researchers interested in the ways in which students use VEs and SPVEs in particular in their learning from slide-lectures.

In terms of exploring general slide-lecture pedagogy to compare the typical text-outline model against the model proposed here, it is noted that the approach taken for the first phase of research is a potentially interesting avenue for such examinations. That a corpus of lecture transcripts on the same topic was assembled provides a particularly useful resource for those studying the teaching of that topic. The aims of the research did not afford space to exploit this corpus to its full potential, as the focus was on the communication practices rather than teaching practices as a whole. Such an approach is invaluable in the examination of general lecture practices which might be employed in slide-lectures, for instance the use of EVSs and affordances for interaction. Such pedagogical elements were noted in this research, but did not comprise a specific line of questioning. It is suggested that this methodological approach might offer much to research into different approaches to slide-lecture pedagogy, in addition to its affordances for examining slide-lecture communication practices.

8.6 Final comments

Although questions regarding the learning outcomes involved in a text versus SPVE heavy approach to slide-lectures remain unanswered, this thesis has opened up debate around this issue by examining and describing the existing slide-lecture communicational practices and their related experiences. It is hoped that the research has contributed to a greater understanding of the potential problems associated with

PowerPoint in lecture pedagogy, and perhaps highlight that when lecturing, one should not use PowerPoint slides to provide a lecture outline simply because that is how things are done. Rather, this thesis is located amongst the literature which considers alternatives to the dominant slide-lecture paradigm, and its contribution to these alternatives is to offer a specific approach to the use of a visual evidence technique. This is the explicit employment of a ‘referent’ type of relationship with whatever evidence appears on the slide, and through this relationship, inviting students to engage with the evidence. The task now remains for lecturers and researchers to consider further the ways in which slide-lecture communicational practices can be modelled for the sustained improvement of HE teaching.

Appendices

Appendix 1 Instructions for Vado use

To work the Vado, press and hold the power button on the top right side. Place the camera somewhere near the front of the lecture theatre so that it will capture the narrative of the lecture and any slides or presentational material, but not necessarily the lecturer. I have enclosed some blu-tack which you may find useful for standing up the camera. Please do not capture any of the audience. Point the camera at your slides/ presentational material (the Vado screen should be facing you) and press the record button (the square one in the middle) when you are ready. Check its recording; there should be a red circle in the top left corner. When you've finished, press the record button again to stop recording and turn it off using the button on the side. There is an envelope enclosed for you to send back the Vado when you are ready.

Appendix 2 Participant Information Sheet

University of Nottingham, School of Education,
Dearing Building, Jubilee Campus,
Nottingham
NG8 1BB

Project Title: An investigation into the optimal integration of visual material with the spoken expositions of educational practice in HE
Lead Investigator: Madeline Hallewell

Dear Student,

This research aims to explore the integration of spoken expositions with visual elements of lectures. This project is supervised by Dr. Charles Crook & Dr. Monica McLean at the University Of Nottingham School Of Education.

I am inviting you to take part in this research study. In return for your participation, I am offering a £10 High Street voucher on completion of your participation. Please take time to read the following information carefully, and feel free to ask me if there is anything that is not clear or if you require more information on any aspect of my study.

What does the study involve and why you?
Data will be gathered using group interviews with myself as facilitator. This will be held on …… following your lecture at ……. Group interviews will last approximately 60 minutes and will be audio recorded but this can be stopped at any point during the interview. I am interested in collecting a range of views from students from Universities across the UK.

In addition to this, I will be collecting a copy of any notes you take during the lecture. This will involve using a carbon copy sheet (which I will supply) to make a copy of your notes while you write, onto paper which I will also supply. You will not need to do anything different whilst taking notes, just make sure that the copy paper is working, and give the copies to me afterwards.

What do you have to do?
If you wish to be involved as a participant please indicate your interest by emailing me (ttxmh18@nottingham.ac.uk). I will make contact with you via your preferred method (i.e. student or personal e mail account and/or by mobile phone). You will be required to bring your lecture notes with you to the interview.
I can confirm that at no time will you be put under any undue pressure to be involved in the research activities and at all times have the right to withdraw from the project. No prejudice or risk will occur should you wish to withdraw from the project. Data generated up to date of withdrawal may be used in the findings unless you request otherwise.

What if something goes wrong? /Who can you complain to?
In the unlikely event of a complaint, please initially raise your concerns with me or failing that please contact either one of my supervisors, contacts details provided at the end of this sheet.

Will my taking part in this study be kept confidential?
This research has received ethical approval from the School of Education with all data generated handled according to British Educational Research Association (BERA) guidelines (www.bera.ac.uk). All data that is collected about you during the course of the research will be kept on a password protected database and is strictly confidential. The collection of data

from participants will be anonymised throughout the research process and in any future publications as well as the PhD. All data collected will be treated in the strictest confidence unless not doing so will result in harm to participants.

Having carefully read this information sheet if you wish to be involved further as a participant, please sign email me. If you decide to take part you are still free to withdraw at any time and without giving a reason.

Contact for Further Information
If at any stage during this study you wish to contact me my details are as follows:
Email: …

Yours faithfully

Madeline Hallewell

Appendix 3 Lecturer interview questions

- What is the role of university teaching?
- What is the role of the first year? Compared to the second and third
- What is the role of a lecture?
- How does your teaching achieve this?
- What do you do to ensure that this happens?
- What is the role of lectures in your teaching?
- What do you usually do in lectures?
- Do you think you have a particular lecturing style? In what way?
- What kind of information do you give in lectures?
- What do you want students to do in your lectures?
- What is the role of this lecture?
- Where does it fit in the module?
- What did you want your students to learn from it?
- What are the key things you want your students to take from this lecture?
- What about the things they don't particularly need to know?
- **What is the role of PowerPoint for you?**
- **A script, a prompt, visual evidence for what you are saying? Clarification of words/ concepts**
- **What is the role of images/ photographs/ video in your slides?**
- **What is the role of text in your PowerPoint slides?**
- **What do you want students to do with the PowerPoint? During the lecture? After the lecture?**
- **Describe your typical style of usage of PowerPoint**
- **Do you like using PowerPoint? Do you have to use it?**

Specific question examples:

- What was the intended purpose of … Photograph?
- Did you intend to read out… slide?

Appendix 4 Student interview questions

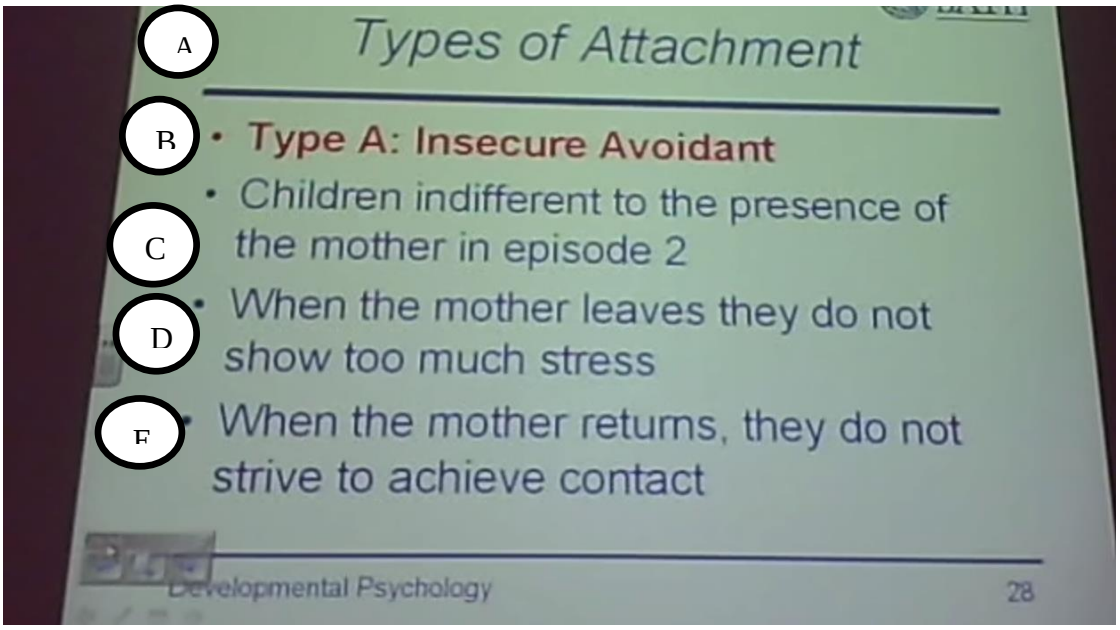
- What do you think the lecturer wanted you to learn from the lecture?
- Do you think this lecturer has a specific style of lecturing? (is this lecturer different to other lecturers?) in what way?
- Did you enjoy the lecture?
- What was most interesting/ uninteresting?
- What were you doing throughout the lecture (taking notes, distractions, listening, reading etc.?)
- Where was your attention during the lecture?
- Was anything particularly easy/ difficult to understand? Why was it easy/difficult?
- What was the role of PowerPoint in this lecture?
- What do you do with PowerPoint handouts after the lecture?
- Do you make notes?
- How do you take notes? Does PowerPoint impact on this in any way?
- Why do some decide to copy PowerPoints and some not? What do they think they are getting from writing down the PowerPoint? How do they decide what extra stuff to write down?
- Does the lecturer's speech match their slides? How is what they say different to what is on the slides?
- Where does the most important information come from? Slides or speech?
- What do you use to revise from? Slides, notes, recording?
- How can you tell what information is important during a lecture? Voice/ PowerPoint/ something else?
- Do you feel like you miss a lot during lectures?
- Could you learn the same thing by just using the slides?
- How do you regard what you are learning? The facts, or something that started off a debate and is continuously changing/ evolving?

Specific questions examples

- **What was the purpose of … photograph**
- **Tell me about… (topic covered either by speech only, text only or combination of both)**
- **What was the lecturer talking about when they showed… photograph**

Appendix 5 Guidelines for analysis of integration of text with speech

Process of Analysis
The transcripts contain the speech on the left and the slide is transcribed on the right. The first job is to identify the expected pattern. To do this you'll need code each element on the slides with an A, B, C, D, E etc. depending on its position. 'Element' refers to the individual text units so a single bulletpoint, quote, or heading. I have labeled each text element on the slide according to the pattern in which I would expect the lecturer to deal with them. For example:



Ignore things like university logos and footers and page numbers. Once the expected pattern is established, the observed pattern of integration by the speech can be produced.

Task 2: Identify the Integration procedures

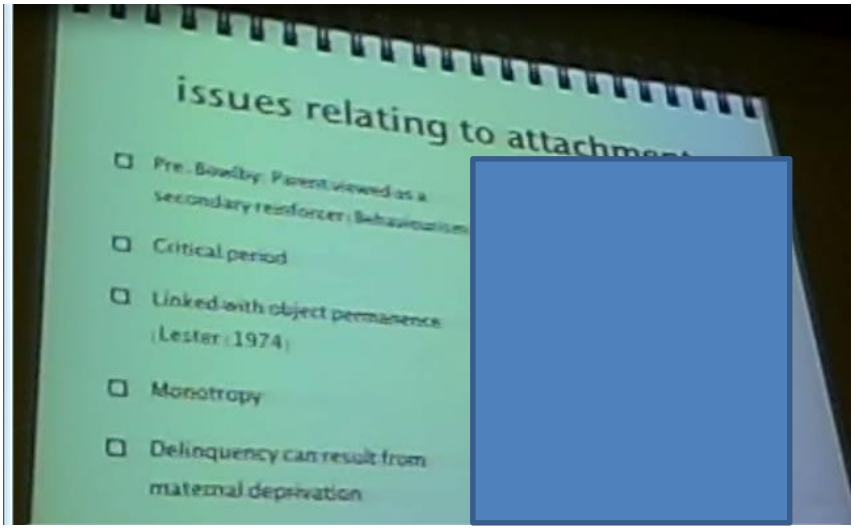
Read the speech to work out where you think the lecturer was making a reference to (or integrating) text on the slide. Below are the things that you will need to look out for in the speech that indicate a reference to something on the slide.

- **Recognition markers & paralleling whole sentences**
  Here the speech will say the same words that are on the slide. They might be in a slightly different pattern, but largely the speech reflects the text.
- **Reformulating & Mangling**
  The speech uses words from the slide but mangles the structure to a large extent. The speech and slide essentially say the same thing, but the speech says it in a different way to the slide. If the messages essentially give different information, then it's not a reference to the slide.
- **Direction & Demonstratives**
  Explicitly directing the student to the element on the slide for example 'this point here', or 'here's a quote that says…' Also the use of demonstratives, such as 'this notion', or 'these things' to point to a slide-element less explicitly (often used in combination with recognition markers towards text).
- **Itemizations**

The speech addresses the structure of the slide, for instance by saying ‘first there is….’ ‘the second theory…..’ and ‘lastly…’ when there is more than one element on the screen. These are usually followed by a recognition marker or mangling of the text.

If you see anything that you think is a reference to the slide but isn’t covered by these descriptions; let me know.

Here’s an example of one I’ve done showing which slide-elements are being referenced for the following slide:



Expected Code	Slide-text	Observed Code	Speech
A	Issues relating to attachment	A	In the issues relating to this, we find that
	(adds bulletpoint)		
B	Pre – Bowlby, mother viewed as a secondary reinforcer. (Behaviourism)	B	before Bowlby posed his um theories, parents were actually not allocated a particularly important role in this so they’re sees as some sort of reinforcer
		None	In the environment whereas Bowlby posed that
C	(adds bulletpoint)		actually there might be a
D	Critical period		
	(adds bulletpoint) Linked with object permanence (Lester 1974)	C	critical period in which children have to form an attachment with a caregiver, and then if this does not happen within this period; that will have valid consequences.
		D	So this is linked with object permanence

So once you’ve identified that the lecturer is making a reference to or integrating something on the slide, you’ll need to code the speech according to the code of the element it is making reference to. If you think the lecturer is making a reference to two items at once, and you can recognize what those are, you should code for both elements identifiable, in alphabetical order.

Appendix 6 Descriptions of speech acts for reliability checking of the DA

Speech act	Description	Example
Conducting Attention	The lecturer identifies the element that will be spoken about using directives or demonstratives,	'this point here' , or 'there you can see'
Questioning	The lecturer questions the element on the slide,	'let's pick this point apart'
Agree/disagree	The lecturer agrees or disagrees with what is written in the element, by saying	'that seems fairly reasonable', or 'actually this is wrong'
Signal Importance	The lecturer identifies that the slide-element is important by saying	'this is an important point'
Verbalising	The lecturer reads out the element	'the early following behaviour of certain young birds such as geese which ensures that the young stay close to the mother and be fed an protected from danger' whilst the same text is displayed on the slide
Merging	The lecturer brings together two elements into the same message	'these two things'
Translating	The lecturer explains what is in the element, or repeats the message in other words	'so this means that…'
Combining	The lecturer blends the text element into their spoken sentence	'Also if we think about the cognitive skills that we've been learning about in this lecture series' whilst displaying the words 'cognitive skills

Appendix 7 Participant consent form

Project title: An investigation into the optimal integration of visual material with the spoken expositions of educational practice in HE

Researcher's name: Madeline Hallewell
Supervisor's names: Dr. Charles Crook & Dr. Monica McLean

- The nature and purpose of the research project has been explained to me. I understand and agree to take part.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential
- I understand that data will be kept on a password protected database and is accessible only by the researcher, supervisors and an administrator, and will be kept strictly confidential
- I understand that I may contact the researcher or supervisor if I require further information about the research, and that I may contact the Research Ethics Coordinator of the School of Education, University of Nottingham, if I wish to make a complaint relating to my involvement in the research.

Signed …… (Research participant)

University …… **Date** ……

Contact details

Researcher: Madeline Hallewell: ……

Supervisor: *Dr. Charles Crook: ……*
Dr. Monica McLean: ……

School of Education Research Ethics Coordinator: ……

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